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THE 1967 SUMMER SCIENCE PROJECT AT UNIVERSITY SCHOOL.

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DESCRIBED IS A SIX-WEEK SUMMER SCIENCE PROJECT DESIGNED TO--(1) PROVIDE TALENTED TEACHERS AND PROMISING STUDENTS FROM DIVERSE SOCIAL, ECONOMIC, AND EDUCATIONAL BACKGROUNDS WITH THE OPPORTUNITY TO TEACH AND LEARN TOGETHER IN CIRCUMSTANCES CONDUCIVE TO CREATIVE ENDEAVOR AND MUTUAL UNDERSTANDING, (2) CONTRIBUTE TO THE DEVELOPMENT OF EDUCATIONAL PROGRAMING IN THE NATURAL SCIENCES, (3) MAINTAIN AND EXTEND THE COOPERATIVE ENDEAVORS OF CLEVELAND'S MAJOR CULTURAL AND EDUCATIONAL RESOURCES, AND (4) INTRODUCE URBAN AND SUBURBAN BOYS TO THE NATURAL EARTH. THE PROJECT INVOLVED 72 JUNIOR HIGH SCHOOL BOYS FROM 21 CLEVELAND URBAN SCHOOLS, 10 SUBURBAN SCHOOLS, AND TWO INDEPENDENT SCHOOLS. LOCAL TEACHERS AND PERSONNEL FROM THE CLEVELAND NATURAL SCIENCE MUSEUM, OHIO UNIVERSITY, AND OTHER COMMUNITY AGENCIES WERE INVOLVED IN CONDUCTING THE PROJECT. A PROJECT RATIONALE AND DESCRIPTION ARE PROVIDED. THE DESCRIPTION IS DIVIDED INTO THE SIX WEEKS COVERED AND INCLUDES FOR EACH WEEK--(1) TOPIC COVERED, (2) CLASSROOM AND FIELD ACTIVITIES, AND (3) RESOURCES WHICH INCLUDE REFERENCES, FILMS, EQUIPMENT, AND PERSONNEL. NUMEROUS PICTURES OF STUDENT INVOLVEMENT ARE INCLUDED. (DS)

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1967
SUMMER
SCIENCE
PROJECT

at University School

SE 003 733

THE 1967

SUMMER SCIENCE PROJECT

AT UNIVERSITY SCHOOL

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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> "All ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. His instincts prompt him to compete for his place in that community, but his ethics prompt him also to cooperate."
>
> Aldo Leopold
> A Sand County Almanac

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The Natural Science Museum
University School

and

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The Cleveland Foundation

INTRODUCTION

Formally, the 1967 Summer Science Project at University School was a cooperative experimental summer program in science supported by a generous grant from the Cleveland Foundation and sponsored by the Cleveland Public Schools System, the Natural Science Museum, and University School, with the cooperation of the Hawken School and other cultural and educational agencies of the Greater Cleveland community.

Its seed was an idea, a conviction, a pervading concern for people and places and things, for boys and the natural earth and programming in science designed to bring the two into significant contact. The nature and scope of these concerns appear in the objectives of the program:

1. To provide outstanding teachers and promising students from widely diverse social, economic, and educational backgrounds with the rare opportunity to teach and learn together in circumstances conducive to creative endeavor and mutual understanding;
2. To make some contribution to the development of educational programming in the field of the natural sciences through the development of an experimental unit in ecology for use both in special summer activities and in regular-term programming in science at the junior high school level;
3. To maintain and extend active, effective, cooperative endeavor on the part of the major cultural and educational agencies of the city of Cleveland;
4. To introduce city and suburban boys to the wonder and beauty of the natural earth and to promote in them a new and much-needed "land ethic".

The structure and format of the Project grew out of the experience gained in the course of two multi-disciplined Summer Institutes conducted jointly by University School and the Cleveland Public Schools System in the summers of 1965 and 1966. That is, its student body included some sixty-nine eighth- and ninth-grade boys drawn from a broad variety of schools, urban and suburban, public and private, including forty who attended without cost as recipients of full scholarships made possible through the generosity of the Cleveland Foundation; its staff was comprised of seven outstanding teachers and four student-aides drawn from similarly diverse professional backgrounds; and this small group of men and boys lived and worked together through six summer weeks in the pursuit of Truth.

The program which they followed was based upon the geology and biota of the Cleveland area, with special reference to the sequence of change -- natural and, more important, man-induced -- which produced its present state. It was sequenced so as to begin with a general orientation to ecology; proceed to an investigation of typical ecological communities, both of land and water, as well as the sequence of natural change; continue to a consideration of the impact of man upon his natural environment; and culminate in the intensive consideration of a problem requiring application of an intelligent, appropriate land ethic.

The following description and picture-story narrative are intended as an informal report of the Summer Science Project at University School, published in the hope that it may be of some use to teachers, review groups, science coordinators, and others in Cleveland and elsewhere interested in the use of the out-of-doors as a learning laboratory. It is not our purpose to stake a claim for the originality of the program, for our approach was certainly eclectic, and we hesitated not a moment to accept help where we could find it. Nor do we seek to support the scientific accuracy of the student work reported here; we were more concerned with promoting in eighth-grade boys a valid approach to truth than with assuring the scientific accuracy of their findings. But, we do feel strongly that the experience has been stimulating and profoundly rewarding to us who were involved in it, and we hope that it may be of use to others who, like us, are concerned with teaching and with science.

Finally, we take this opportunity of expressing our deep appreciation to the Trustees of the Cleveland Foundation, whose sympathetic understanding and generous support have made the Summer Science Project possible.

The Staff
1967 Summer Science Project
at University School

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INCEPTION

The Summer Science Project effectively began in the fall of 1966 with a series of meetings of representatives of the Cleveland Public Schools, the Natural Science Museum, and University School, in the course of which the outlines of the Project were gradually defined. In March, 1967, a formal proposal was presented to the Cleveland Foundation, requesting financial support in the form of full scholarships (at $300) to permit forty inner-city junior high school boys to share six weeks with eighteen suburban boys, seven master teachers, and four teacher-aides. From June 19 to July 28, 1967, they would read and watch, listen and challenge, measure and dissect, trap, skin, weigh, count, seine, filter, and analyze the water and land communities of the Greater Cleveland area -- all in recognition of the desperate need for men willing and able to test, examine, know, and love the natural earth and in whom has been nurtured early in life the foundation of an appropriate, intelligent land ethic.

Meanwhile, arrangements had been made for necessary materials -- application blanks, recommendation forms, a brochure describing the program; contact had been made with prospective staff and teaching personnel; a number of field sites had been located and arranged for; necessary materials and special equipment had been decided upon and listed; procedures for the recruitment and selection of the student group had been established; and a preliminary information meeting had been held to orient suburban school superintendents to the proposed new program.

Upon the Foundation's approval of the Project proposal, immediate steps were taken to implement the program: Dr. George Theobald, Assistant Superintendent for Instruction, Cleveland Public Schools System, contacted the proper authorities in each of the twenty-five City junior high schools, urging each to select qualified and interested students for interview, and necessary materials were dispatched to the counselors in each school. At the same time, authorities of the suburban public and independent schools were invited to nominate qualified candidates, and they too were provided with the necessary materials. Mr. William Scheele, Director of the Natural Science Museum, generously released Mr. Russell Hansen, Staff Naturalist and Director of the Museum's Future Scientists Program, to help plan and carry out the Project. The staff was formally appointed and advised of the series of planning sessions which would run through May and much of June under the direction of Mr. Joseph Chadbourne, Program Director. And Mr. Jonathan Ingersoll, Project Director, began the long -- and sometimes frustrating -- business of selecting from many candidates from more than thirty schools the sixty-nine who would participate in the program.

And at nine o'clock on the morning of June 19, the 1967 Summer Science Project at University School formally opened with a convocation of the student body, staff, and representatives of the sponsoring institutions.

STUDENTS AND STAFF

The Students

The students were selected through a process developed in the course of the two previous Summer Institutes and, like all facets of the program, involved a cooperative effort on the part of the sponsoring institutions. Immediately after the Cleveland Foundation's decision to fund the Project, all twenty-five junior high schools of the Cleveland Public Schools System received from the Superintendent's Office a document describing the program briefly, indicating the qualifications for enrollment as agreed upon previously among the Program's sponsors, and requesting nominations from each of the schools. A day later, a kit of materials was mailed to the junior high school counselors, including an announcement flyer, application blanks, and recommendation forms (see Appendix).

Also, contact was made with a variety of local suburban and independent schools, most of whom had been introduced to the program previously at a meeting of headmasters and suburban superintendents.

When the counselors had made their recommendations and returned the completed applications, arrangements were made for members of the Project staff to visit the schools and meet the candidates. Since in most cases it was necessary to interview the students in groups as large as twenty, the interview could not, in most cases, be used as basis of selection; it was informative for the boys, however, and established basis for rapport later with those who were accepted. Also, aptitude and achievement tests proved a difficult yardstick to measure by; because the tests differed widely among the schools and were given at different age levels, in many cases the data available proved something less than useful.

In practice, the selection process weighted the counselor's recommendation first, clear interest in the program second, and measured aptitude third. And though I.Q. in the superior range was an initial premise of selection, the final student body ranged from 105 to 161, with the median at 123. And since no correlation between I.Q. and performance was apparent at the conclusion of the Project, there is reason to believe that lower I.Q. ranges can be approached with considerable confidence in this kind of endeavor.

Of the seventy-two boys finally chosen, forty-eight came from twenty-one different City schools, sixteen from ten suburban schools, and the remaining eight from two independent schools. Five of the forty-eight inner-city students withdrew before the start of the program; two were replaced from a waiting list. Of the sixty-nine boys who began the Project, only one dropped out for lack of interest (in the fifth week), so that sixty-eight received the Certification of Completion at an informal graduation ceremony attended by over three hundred parents, relatives, and friends of the student group, as well as representatives of the sponsoring institutions.

and Staff

In addition to the Director and a part-time secretary and photographer, seven instructors and four student-aides comprised the formal staff of the Summer Science Project. In addition, Mr. Russell Hansen of the Natural Science Museum was retained to help in planning the effective use of regional resources and participated directly in the leadership of several field studies. Furthermore, the program was vastly enriched by the contributions of a host of generous and talented professionals who gave freely of both time and information in a broad range of disciplines including astronomy, geology, botany, soil conservation, vertebrate zoology, industrial chemistry, meteorology, waste control, land ordinances, water purification, sewage treatment, architecture, and city planning. Their major contributions provided muscle and flesh to our skeleton program. For, in a very real sense, people and problems were the program.

The teaching staff represented an unusually broad gamut of professional experience. In addition to three members of the University School faculty (including the Program Director), it included an instructor at a local university (John Carroll), two City high schools (Shuler and Roosevelt), a suburban high school (Lakewood), and an independent school (Hawken). Overall leadership was provided by the Program Director (University School) who played the major role in devising and coordinating the summer program, and by the Project Director, also a member of the University School staff, who had participated in the first Summer Institute and thus who brought to the Project background and administrative know-how that proved invaluable in all stages of planning and carrying out such varied activities as transportation and meals, community relations, activities schedules, and contact with the students' parents and schools. The four student-aides were chosen from a local university (Ohio University), a City high school (Kennedy), a suburban school (Mentor), and University School. Since all had been members of the Future Scientists Program of the Natural Science Museum, they brought to the proceedings an unusual richness of background and a kind of enthusiasm that proved contagious.

The Project secretary (Laurel School) and the photographer (University School) were provided for in the initial planning in order to promote the longer-term objectives of the program. Thus, the bulk of this report must be credited to them and to one member of the Project staff in particular, Mr. Francis H. Osborn of Carl F. Shuler School.

THE PROGRAM

> "The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively, the land."
>
> Aldo Leopold
> A Sand County Almanac

The Summer Science Project at University School was concerned primarily with "soils, waters, plants, and animals, or collectively, the land." That is, its chief objective -- developed through a series of preliminary meetings of representatives of the sponsoring institutions, and given clear form through the perception of Mr. William Scheele, Director of the Natural Science Museum -- was the development in young people of an appropriate and enduring "land ethic", through the intensive scientific study of the natural earth. Specific outlines of the six-week accumulating-sequence program were developed thereafter, primarily by the Program Director, Mr. Joseph Chadbourne of University School, Mr. William Hallaran of Hawken School, and Mr. Russell Hansen of the Natural Science Museum. Subsequently, instructors and student aides, working in teams, addressed themselves to the specific details of presentation, field investigation, laboratory tests, equipment, sites, specialized personnel, transportation, time schedules, and so forth -- all of which required close coordination if the idea of an accumulating-sequence was to be maintained.

The scheduled day began at 9:00 A.M. and closed at 3:00 P.M., though many boys arrived much earlier and often remained much later. Occasionally, distance or duration of field trips necessitated later dismissal. Typically, boys used public transportation to and from the point of assembly (the cost of which was included in all scholarship awards); transportation involved in all field work took the form of two buses, for the loan of which their owners, Hawken School and University School, were paid a nominal fee. Since the vehicles were not permitted to make passenger stops enroute, and since they were driven by members of the Project's faculty, no special licensing was required.

Simple ninety-five cent box lunches were purchased daily from a local caterer (Hough) and provided to all boys without additional cost; typically they contained a sandwich, fresh fruit, cake, milk, and a salad. Delivered to University School each morning, they were then transported to the field shortly before noon by a member of the staff. Milk was normally transported in ice-filled pails; and in all cases empty containers and waste were returned to the school and incinerated there.

As in the case of the previous Summer Institutes at University School, students were neither graded nor tested in the course of the summer. At the midpoint of the program, a personal note was addressed to each parent (see Appendix), briefly describing their son's progress subjectively. An eight-page picture-story brochure was presented to each boy, together with a Certificate of Completion, at the concluding ceremony.

FUNDS

Funds requested were based upon a per student cost of $300. They were estimated at $14,000 total, $12,000 to provide full scholarship to the 40 inner-city boys (including tuition, lunch, and all materials) and an additional $2,000 in support of other boys unable to defray the full cost.

		Proposed	Actual	
Services	Director	$2000	$2000	
	6 teachers @ $1000	6000	7000	(1)
	5 aides @ $300	1500	1200	
	Clerical and Custodial	900	900	
Payroll taxes and insurance		580	685	
Food Service		2500	2201	
Transportation (including field trips)		1170	866	(2)
Books and supplies		750	906	
Special programs (family picnic, overnights, etc.)		500	648	
Planning and printing		800	1379	(3)
Administrative supplies and expense		100	152	
Films, 16mm, 35mm and development		700	815	(4)
Counselling fee, Natural Science Museum		500	500	
		$18,000	$19,252	
Income	Tuition and gifts	4000	5772	
	Grant from Cleveland Foundation	14000	14000	
		$18,000	$19,772	
Balance of funds				
	Actual Income less Actual Expenses		19772	
			19252	
	Surplus		520	

(1) Actual staff was seven teachers and four aides
(2) Savings realized by using teachers as bus drivers
(3) Additional copies of this publication required for national conventions
(4) Additional cost for October TV - conversion of 8mm to 16mm film

EVALUATION

Evaluation of the Summer Science Project has proved immensely difficult. The problem lies primarily in the fact that the objectives of the Project were essentially behavioral rather than cognitive, so that they cannot be demonstrated through pre- and post-testing. The program was founded in the belief that "experience is the best teacher", and a deliberate effort was made to provide experiences that did indeed teach. Under these circumstances, it appears that the cognitive aspect of the Project can be evaluated only through careful attention to the descriptions provided in this report and the careful photo-record that was made in an effort to record and help interpret the learning activities involved.

Meanwhile, the following comments are provided relative to the four major objectives of the program stated in the March 1967 proposal, in the hope that they may provide an estimate of the program's relative success or failure:

> A. "To provide outstanding teachers and especially promising students from widely diverse social, economic, and educational backgrounds with the rare opportunity to teach and learn together in circumstances conducive to creative endeavor and mutual understanding."

Comment: Altogether, some eighty-two men and boys participated in the Project, chosen from forty-three different schools and representing incredibly varied racial, social, religious, and economic backgrounds. And though these differences were clearly reflected in attitude and point of view, it is significant that not once throughout the six-week program were they basis for conflict, and often they served as important stimulus to discussion and the pursuit of truth generally. It is perhaps too much to expect that the associations formed across the lines of racial, social, and economic difference should remain intact after the close of the program; unfortunately, geography and way of life seem to legislate against such continuing rapport. And yet, the experience of summer 1967 confirms the evidence of previous summers that youngsters of widely different backgrounds can indeed surmount their differences and live comfortably together in the common pursuit of a project worth the doing.

> B. "To make some significant contribution to the development of educational programming in the field of the natural sciences."

Comment: In this context, the Project seems valid in at least two dimensions. In the first place, there is evidence that it stimulated members of the student group to participate in and assist in the development of similar kinds of activity in the community: six of them took part in the Izaak Walton League's October Weekend Workshop; sixteen made application to the Future Scientists Program of the Natural Science Museum; a number are being used by professional teachers to help develop similar projects in their present schools; five have taken part in programs intended to describe the Project to the community, including a 30-minute program produced by local television.

In addition, there are indications that the Project may have some impact upon science programming in the schools: University School has reordered its programming at Grades VII, IX, and XII to make use of the outdoor laboratory, and more limited steps have been taken by several other schools in the community. Also, it is clear that the Project has served to coalesce growing community interest in the use of wilderness properties for educational purposes, a concern which promises to culminate in the early spring with a visit to the Cleveland area by Secretary Udall. In addition, deliberate steps are being taken to make the story of the Summer Science Project more widely available: this report will be mailed to interested parties in the Cleveland area and elsewhere, and formal presentations involving movies and slides have been scheduled at the National Association of Biology Teachers (Omaha, November 17-18), the National Association of Independent Schools (Houston, March 21-22), and the National Science Teachers' Association (Washington, March 29-30).

C. "To maintain and extend active, cooperative endeavor on the part of the City's major cultural and educational resources."

Comment: Like the Summer Institutes which preceded it, the Project provided the catalyst for active, common endeavor not only on the part of the several sponsoring agencies but also on that of myriad representatives of other community resources, more than a dozen of whom gave freely of their energy and talent in the course of the six-weeks program. Furthermore, the Project has served as stimulus to a teacher-training program proposed for the summer of 1968 under the joint sponsorship of Cleveland State University, the Cleveland Public Schools System, the Natural Science Museum, and University School. To this end, a formal proposal has been filed with the National Science Foundation for funds with which to underwrite the Cooperative Science Program for School System Improvement, in the course of which twenty-five outstanding teachers from the Cleveland Public Schools System and a similar number from associated suburban public and independent schools will undertake a seven-weeks training program in a curriculum based upon the Project's program and operated in conjunction with the 1968 Summer Science Project. A unique characteristic of the proposal is the proposed intermingling of both students and staff of the two programs throughout the course of the summer, culminating in the final week during which the teachers-in-training work closely with the members of the Project student group on a series of field problems designed to be of value to both groups of participants.

D. "To introduce City and urban boys to the wonder and beauty of the natural earth and to promote in them a new and much-needed 'land ethic'."

Comment: Of the major goals of the program, this one is the most difficult of demonstration, for essentially it constitutes the development of attitudes. And yet, there are indications that the Project did make significant progress in this area. It is significant, for instance, that at several points in the course of the summer, student comprehension of the implications of man's use and misuse of land astonished guest speakers. In the course of the final week, for instance, arrangements were made for the boys to meet with the University School architects who were at the time deeply involved in final plans to locate a new Upper School division on the Hunting Valley site. In the course of these meetings, the boys' profound and informed concern for the integrity of the natural land proved such as to induce the professionals to make substantial alterations in previous plans, and recommendations made by the student group served as stimulus for subsequent studies by members of the Natural Science Museum, the Metropolitan Parks Commission, and the Soil Conservation Service -- all of which induced further changes in site planning. Altogether, there seems little doubt that the boys who made up the first Summer Science Project left it far more sensitive to the natural earth and more concerned about man's proper use of it than they had been before.

In this last regard -- indeed in most regards -- a final estimate of the Project's significance must await the judgment of the future and in this sense must depend upon effective follow-up for its validity. Unhappily, it is in this area that the least satisfactory plans were made for the 1967 program. Some effort was made in the appointment of staff to select teachers from schools which provided a significant number of participating students, so that at the close of the program teachers and boys might find it possible to maintain contact in their regular school lives. Other boys will retain some contact with the Project through participation in such parallel activities as the Future Scientists Program; and all will be invited to participate in periodic reunions of the student group. These measures promise only limited follow-up, however, a fact which suggests additional procedures for the 1968 program:

1. Definite arrangements, firmly made in advance for a qualified teacher in each of the schools represented by the participating student group to observe and evaluate the students' performance during the academic year with special reference to contribution to work in science and changes in attitude and behavior;

2. Provision for teachers participating in the proposed NSF-CSU cooperative school program to take part in a continuing series of seminars through the academic year designed both to maintain the continuity of the Project program and to develop more effective follow-up procedures;

3. Extensive film coverage of both the 1968 Summer Science Project and the CSU-cooperative school program such that it may be made available to educational TV through the academic year 1968-1969 for use by both teachers and students.

The March proposal cited also some longer-range goals of the Summer Science Project. It was, for instance, hoped that the Project might

> "serve as a source of supply of superior teachers and students as impetus to and nucleus of continuing studies in ecology and land use,
>
> "inspire the adoption by local schools of portions of the ecology program for use in the regular academic year,
>
> "contribute to the development of permanent outdoor laboratories available to students in area schools on a year-round basis."

Needless to say, these are ambitious goals; indeed, they might seem almost pretentious were they not most earnestly held by all involved in last summer's program. It appears that some progress has been made toward each of them in the course of the planning and implementation of the first Summer Science Project at University School. It is quite clear, however, that they can be realized only through continuing effort and concern on the part of all agencies concerned with education and land use, both local and national. But, a start has been made and there seems good reason for optimism regarding the immediate future.

If this optimism proves justified, then the Project will indeed have justified the efforts of the several sponsoring institutions and the generous confidence and support of the Cleveland Foundation.

PERSONNEL

Jonathan E. Ingersoll,	Project Director University School
Joseph H. Chadbourne,	Program Director University School

Teachers

William Coleman	Lakewood High School
Cosmo DiBiasio	University School
John Ferrara	John Carroll University
William Hallaran	Hawken School
Russell Hansen	Natural Science Museum
Benjamin Harrell	Franklin D. Roosevelt Junior High School
Francis Osborn	Carl F. Shuler Junior High School

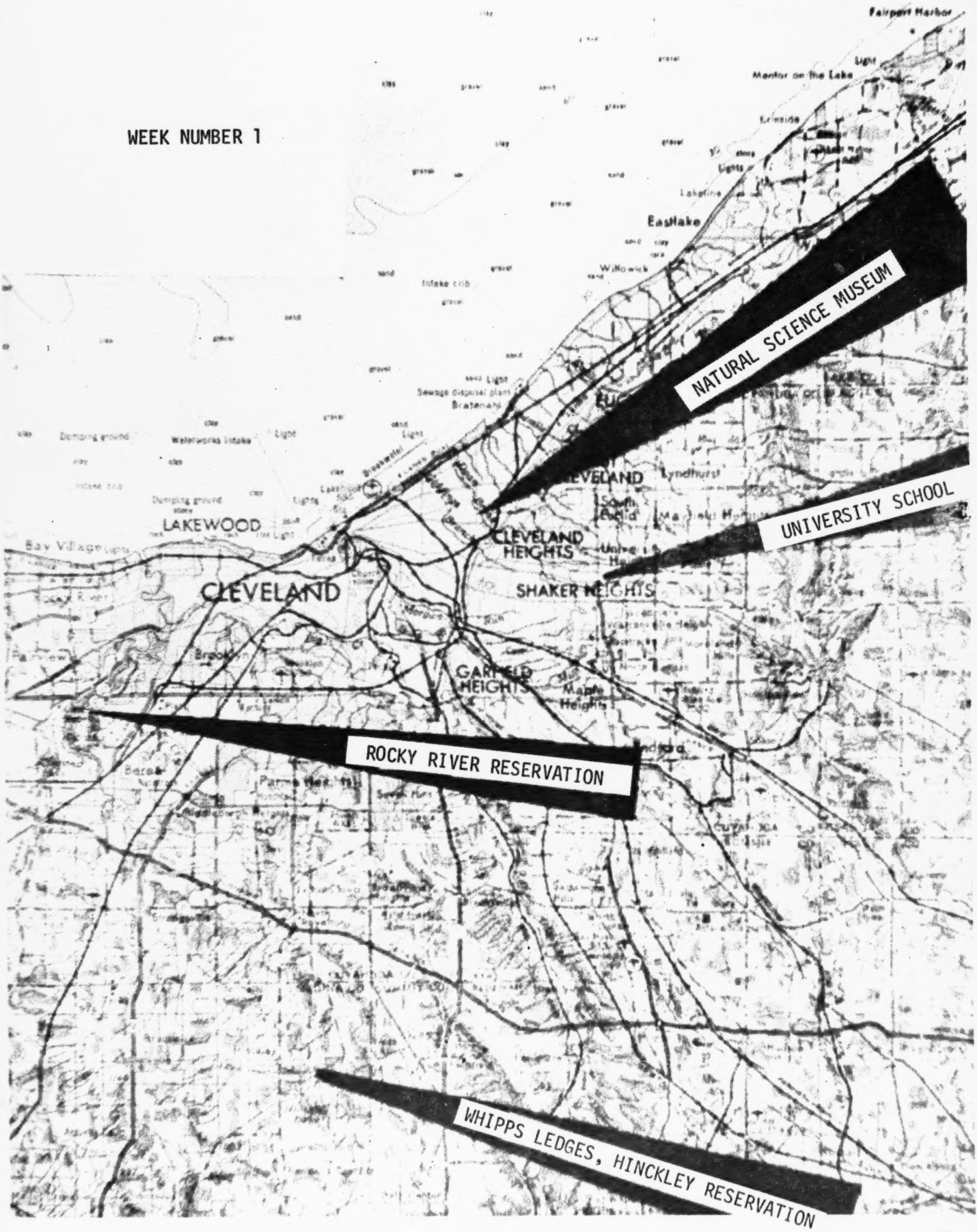
Aides

Francis Brown	John F. Kennedy High School
Michael Kulczycki	Ohio University
William Schlesinger	University School
Douglas Yates	Mentor High School

Staff

Ellen Knox	Secretary Laurel School
Noel E. Wines	Photographer University School

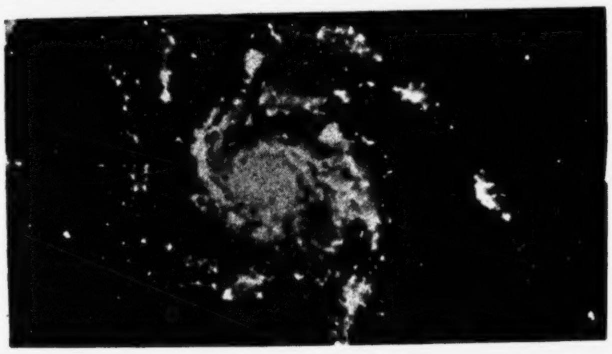
WEEK NUMBER 1


Fairport Harbor
Mentor on the Lake
Eastlake
Willowick
Intake crib
Sewage disposal plant
Bratenahl
Dumping ground
Waterworks intake
Bay Village
LAKEWOOD
CLEVELAND
CLEVELAND HEIGHTS
Lyndhurst
South Euclid
SHAKER HEIGHTS
GARFIELD HEIGHTS
Maple Heights
NATURAL SCIENCE MUSEUM
UNIVERSITY SCHOOL
ROCKY RIVER RESERVATION
WHIPPS LEDGES, HINCKLEY RESERVATION

The First Week

We started our story way back in time and far out in space. We outlined theories, developed models, and then looked for the evidence in Cleveland to support these ideas. This history of change would form the reference for measurements, questions, and predictions for the later weeks.

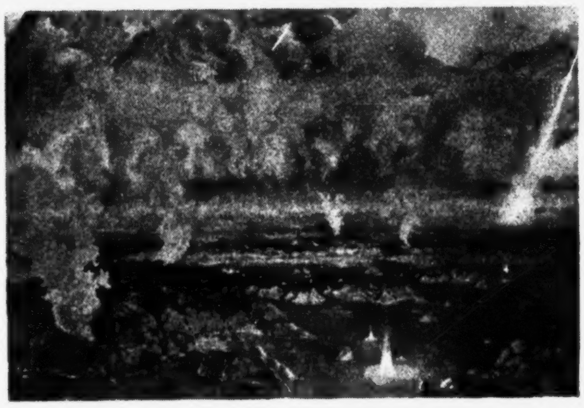
A THEORY
about the origin of the universe . . .



Some think between 10,000,000,000 and 5,000,000,000 years ago swirling gases condensed or collided to form our solar system. The Earth's moon might have formed simultaneously or, later, broken away from this flaming planet. [1]

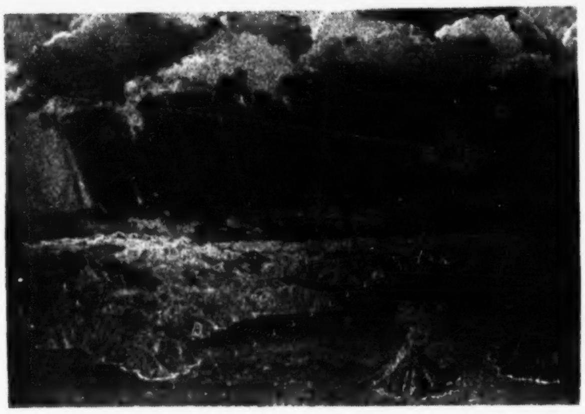
We imagined subsequent changes through lectures [2], slides [3], films [4], and publications. These were presented at University School and, principally, The Natural Science Museum.

Gradually cooling from the enormous heats generated by condensing gases and radioactivity, the Earth's crust formed about 4,500,000,000 years ago. Unable to contain that heat energy, the surface has been venting, erupting, and shifting ever since. These created the major variety of formations in our geology. [5]



*NSM

Perhaps 4,000,000,000 years ago, eroding waters, condensed from the Earth's slowly cooling atmosphere and interior, formed rivers and oceans. Then, energy from the sun's ultraviolet light, lightning, and erupting volcanoes acted on gaseous water, methane, ammonia, and hydrogen to produce amino acids and sugars. By 3,500,000,000 years ago, enough oxygen had formed ultraviolet-trapping ozone and cooled the Earth's surface to 140°F - cool enough for fragile life! [6]



NSM

* By permission of The Natural Science Museum, Cleveland, Ohio.

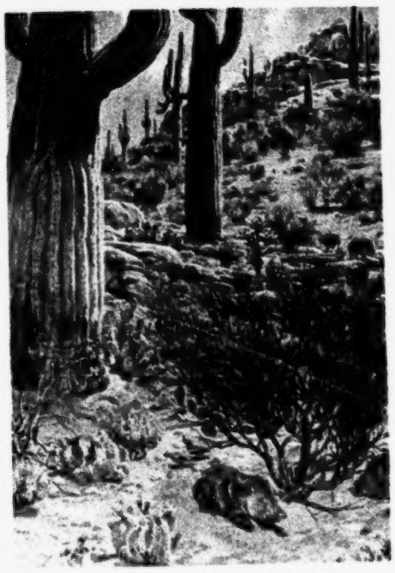
Some of those waters formed glaciers, which also have been moving over continents ever since, scouring and depositing as they go . . .

NSM

These early, continuing forces and the life following, possibly as long ago as 3,500,000,000 to 2,700,000,000 years, created some of the basic ecosystems we see in transition today:

Russell Hansen, Natural Science Museum

The Tundra NSM



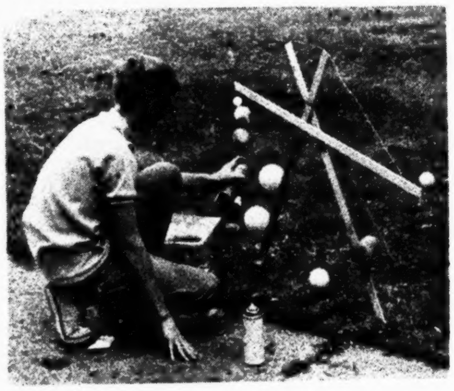
Desert NSM

Alpine Meadows NSM

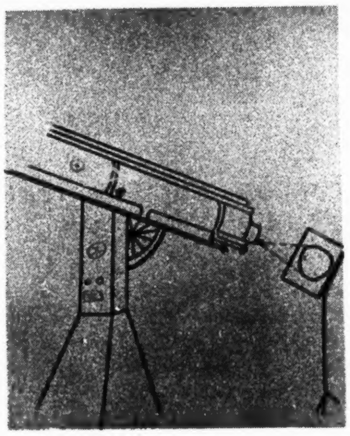
Pine Forest NSM

Deciduous Forest

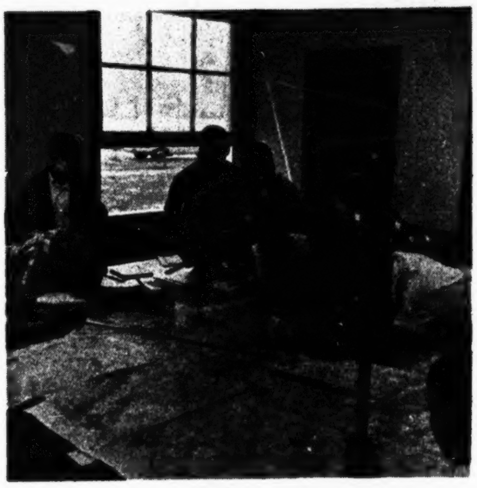
And some MODELS, or constructs, like the artist/scientist conceptions photographed above, and



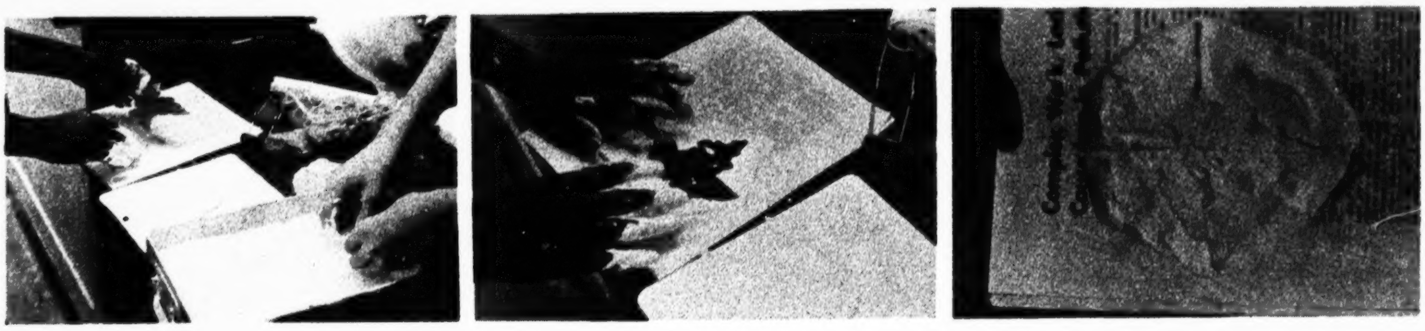
solar system distance/ size mock-ups [7],



projections of the sun's spots [8],

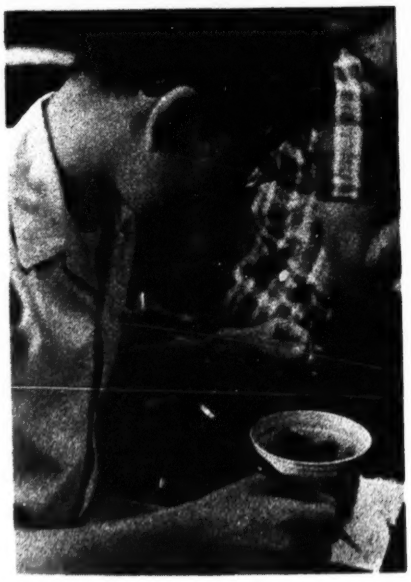


and contour maps of the Cleveland region [9],



and fossil replications from Plaster of Paris,

and man-made light bulbs analogous to the sun...



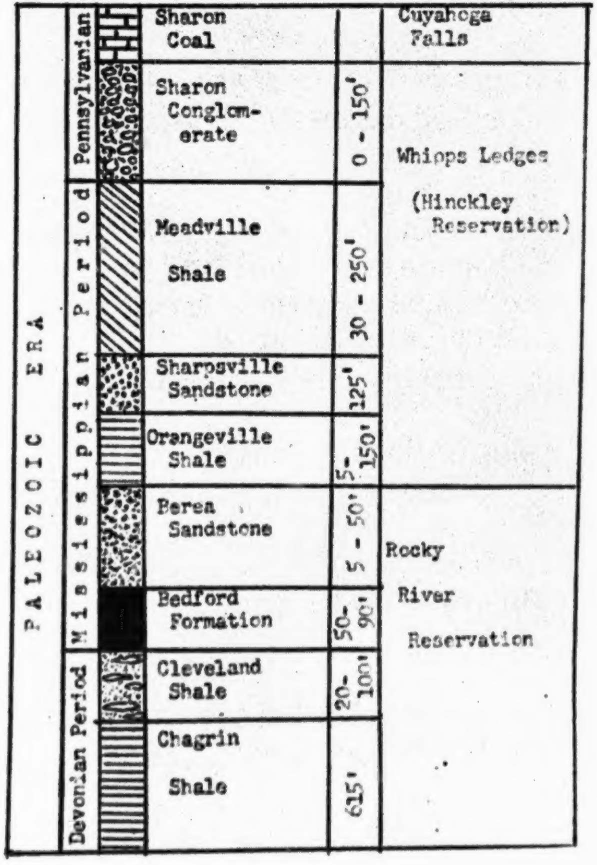
and bean plants to vegetation,

and lab mice to animals.

These last were projects to develop data for use in the third week, when we would compare laboratory with field information.

Finally, we looked at the local EVIDENCE, to see if we could support the stories about the universe, solar system, Earth, and the Cleveland topography.

We assumed that rock layers are time layers, and if the forces we know today were operating then, we can look at the rocks and look back in time.

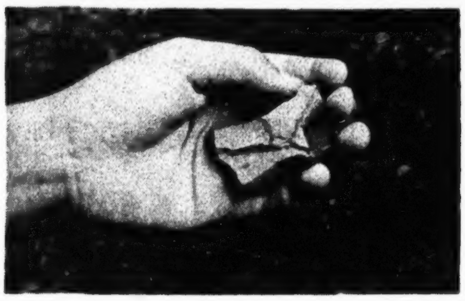

PALEOZOIC ERA
Pennsylvanian
Mississippian Period
Devonian Period
Sharon Coal
Sharon Conglomerate
Meadville Shale
Sharpsville Sandstone
Orangeville Shale
Berea Sandstone
Bedford Formation
Cleveland Shale
Chagrin Shale
0 - 150'
30 - 250'
125'
5-150'
5 - 50'
50-90'
20-100'
615'
Cuyahoga Falls
Whipps Ledges
(Hinckley Reservation)
Rocky River Reservation

[14]

Russell Hansen, Natural Science Museum [10]

[11]

David Kotila,
Baldwin-Wallace



[12]

And since there were different kinds of rock, the eroding wind and waters slowly carried away and deposited different kinds of soil. These formed the foundation for environmental variations - the niches - which would then be occupied by plants, and still later, animals.

We could see, and even measure, some of these successions - slowly, steadily changing before our eyes!

Devonian Dunkleosteus [13]
NSM

1st Week
5

RESOURCES

[1] Bergamini, David, The Universe, Life Nature Library; Time, Inc., New York, N. Y.

[2] Snow, Dan; Natural Science Museum, Cleveland.

[3] Lantern slides made with Polaroid 46-L Positive Transparency Film, development time 2 minutes, 800 series Polaroid Camera. Photographs made from a variety of sources for lectures.

[4] a. "The Myths and the Parallels", Association Films, Inc., LaGrange, Illinois. (Graphic study of crowding, mechanization, pollution.)
b. "Rocks and the Record", Life, Time and Changes Series, American Institute of Biological Sciences; McGraw-Hill, New York, N. Y. (General introduction to paleontology with section on radiometric dating.)
c. "Conservation and Balance in Nature", Audiovisual Center, University of Illinois, Champaign, Illinois. (General presentation of ecological relationships.)

[5] Beiser, Arthur, The Earth, Life Nature Library; Time, Inc., New York, N. Y.

[6] Shneour, Elie A., Biology Meets Astronomy. Biological Science, Teaching Tips from TST, 1967. NEA Publication Sales Div., 1201 16th Street, NW, Washington, D. C. 20036.

[7] Pribil Displays Inc., 3620 Superior Avenue, Cleveland, Ohio, for styrofoam materials.

[8] Observed at the Natural Science Museum.

[9] Burrows, 419 Euclid Avenue, Cleveland, Ohio, for Geologic Survey maps.

[10] Russell Hansen, Natural Science Museum, at Whipps Ledges, Hinckley, Ohio.

[11] David Kotila, Department of Earth Science, Baldwin-Wallace College, Berea, Ohio, at Rocky River Reservation.

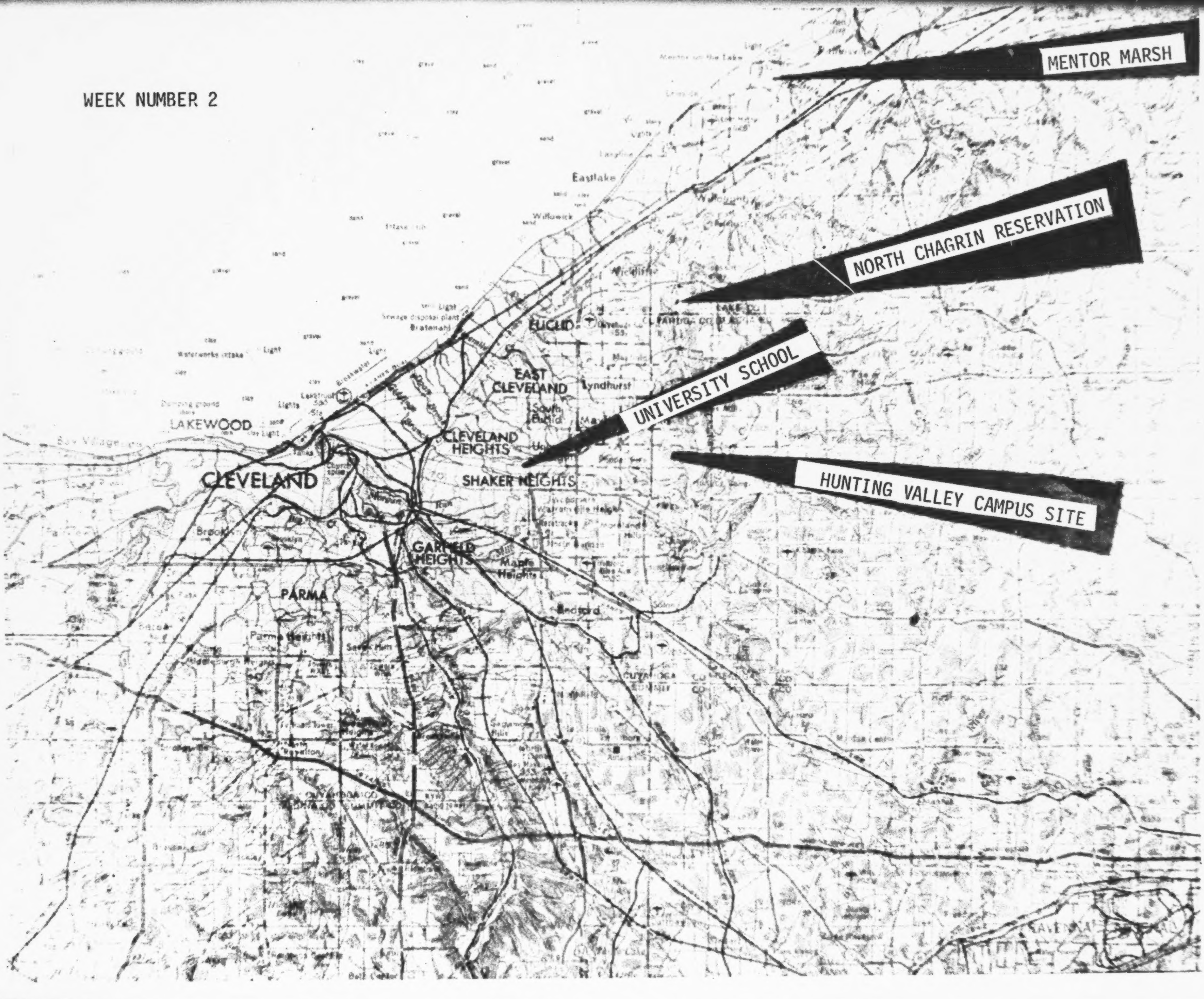
[12] Ibid., at intersection of East and West branches of Rocky River.

[13] Model of Devonian Dunkleosteus from fossil remains found near site in photograph 12, above.

[14] "Lakewood Valley Day Rocky River Field Trip", Lakewood Public Schools, Lakewood, Ohio.

NSM. All photographs marked NSM are printed with permission of The Natural Science Museum, 10600 East Boulevard, Cleveland, Ohio.

WEEK NUMBER 2


MENTOR MARSH
NORTH CHAGRIN RESERVATION
UNIVERSITY SCHOOL
HUNTING VALLEY CAMPUS SITE
Eastlake
Willowick
Bratenahl
EUCLID
EAST CLEVELAND
Lyndhurst
South Euclid
LAKEWOOD
CLEVELAND
CLEVELAND HEIGHTS
SHAKER HEIGHTS
GARFIELD HEIGHTS
Maple Heights
Bedford
PARMA
Parma Heights
Brooklyn
Breakwater
Sewage disposal plant
Waterworks intake

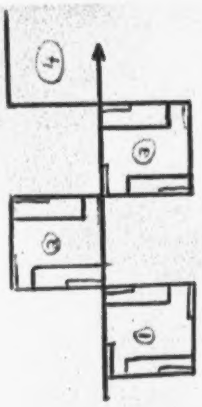
The Second Week

We suspected weekend affairs would tend to unitize our program, whereas we wished to emphasize continuity. Therefore, we used every opportunity to recapitulate. Thanks to Kodak 48-hour service, we projected the first week's photographs on Monday morning. Later, we reviewed ideas with movies, handouts, and especially by preparing guest speakers.

We tried, then, to recount that the Earth's position with respect to the sun, atmospheric conditions, the crustal shifts, glaciers, erosion, decomposition would produce an endless variety of ecosystems. If so, we should be able to describe them and measure the changes. We started with a terrestrial community.

. . . but this time THEY did the work!

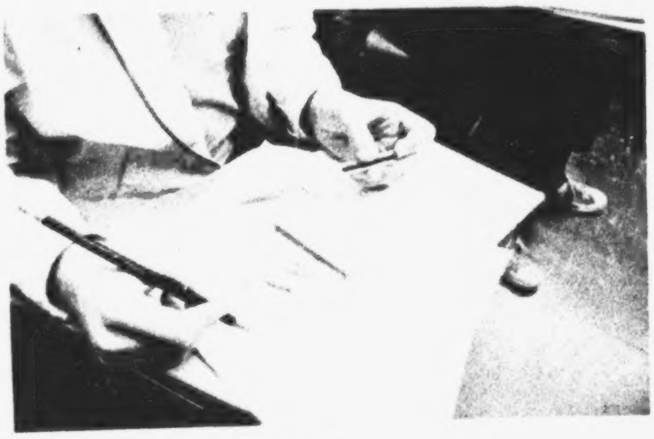
They learned how to sample statistically, using



Quadrats . . .

10 x 10 meter - trees
2 x 8 meter - shrubs

1/4 x 4 meter - herbs



And to use "keys"
for identification . . .

and to read instruments,

- even the handicapped!

2nd Week

We identified kinds and determined amounts in three distinct communities: wet, intermediate, and dry. Kinds and amounts of all kinds of things -

pHydrion Papers

. . . pH of the soil,

. . . and its moisture content,

. . . atmospheric humidity,

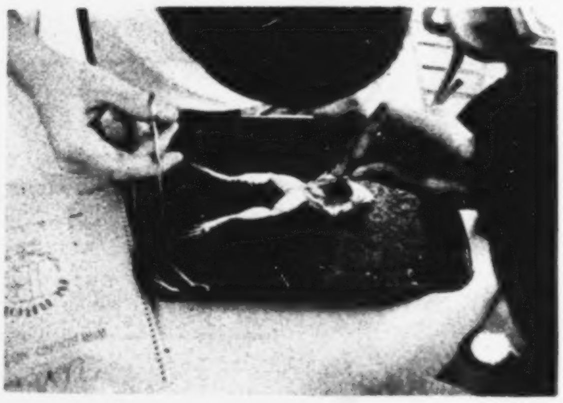
. . . depth of topsoil
with Joe Steiger, Soil
Conservation Service

. . . and insects;

. . . and animals,

Larry Isard, Natural
Science Museum

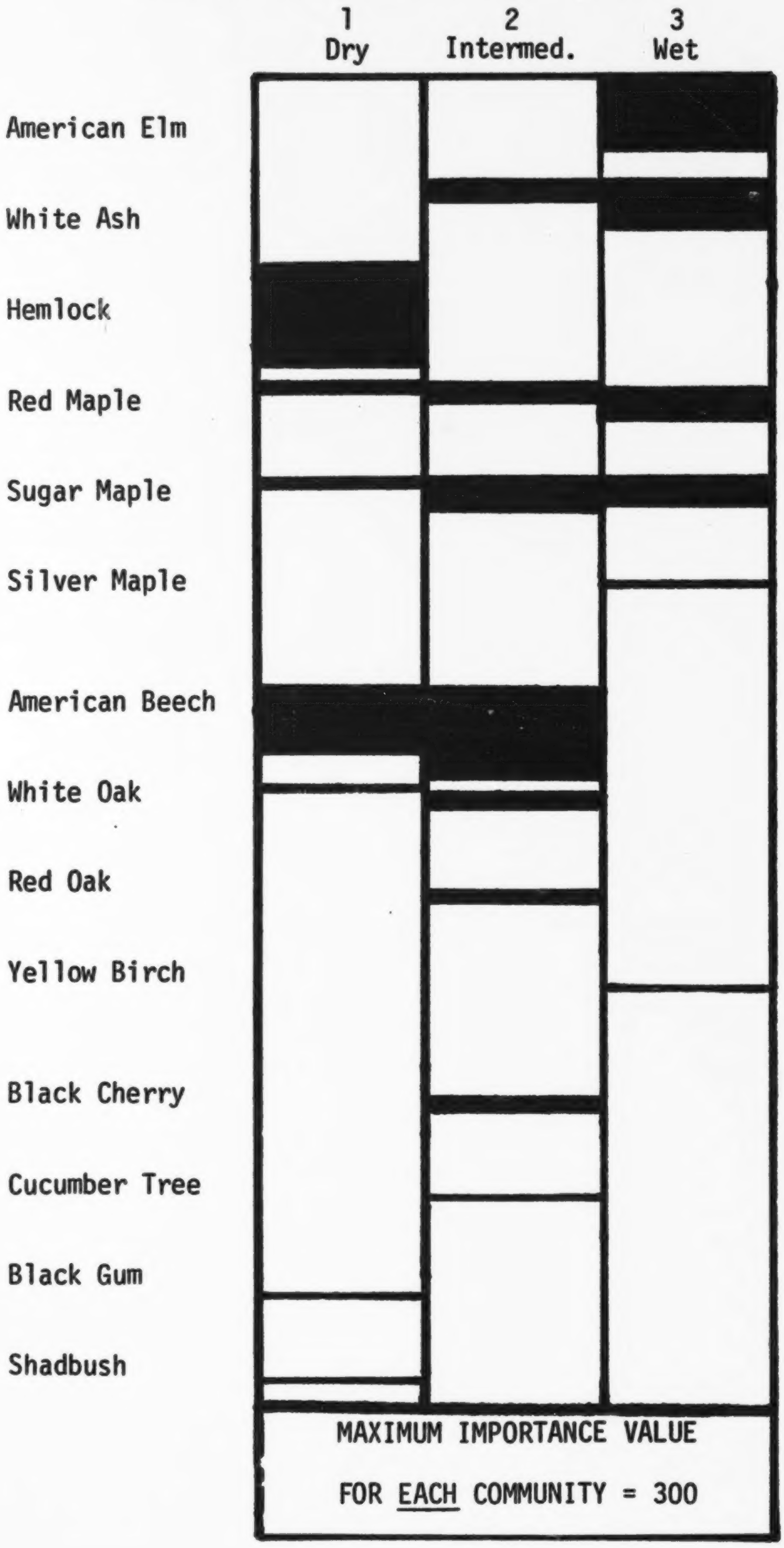
. . . and plants,



. . . and insides!

2nd Week

Then, we compiled some of the data,



(1) Dry: Beech-Hemlock Forest at North Chagrin.

(2) Intermediate: Pre-climax Beech-Maple Forest at Hunting Valley.

(3) Wet: Ash-Elm-Maple Swamp Forest at Mentor Marsh.

And when it was analyzed, we noticed marked differences among each type of community.

But, still, why? How are the soils different? Why is there more water in one place than another? What factors regulate growth, competition, selection . . .?

* * *

RESOURCES

Resources Persons:

Frank Kukowitch, Ben Franklin School, Cleveland - wild flower and nature slides.

Laurence Isard, Natural Science Museum, Cleveland - preparation of study skins.

Duane Bosworth, Soil Conservation Service, U. S. Department of Agriculture, Chesterland, Ohio.

Films:

"Succession: From Sand Dune to Forest", Encyclopedia Britannica Films, #1782, Kent State University Audio-Visual Center, Kent, Ohio. Photographed in sand dune area on south-east shore of Lake Michigan. Detailed record of sequence of plant and animal forms, from bare beach to beech-maple forest environment.)

"The Changing Forest", National Film Board of Canada, Kent State Audio-Visual Center, Kent, Ohio. (Ecological sequence, photographed along southern fringe of the Canadian Shield.)

Text References:

DeWaard, E. John, What Insect Is That?, American Educational Publications, Inc., Columbus, Ohio, 1965.

Watts, May T., Tree Finder, Nature Study Guild, Box 972, Berkeley, California.

Hall, E. Raymond, Collecting and Preparing Study Specimens of Vertebrates, University of Kansas Museum of Natural History, Lawrence, Kansas, 1962.

Hillcourt, William, Field Book of Nature Activities and Conservation, G. P. Putnam's Sons, New York, N. Y., 1966.

Mathews, F. Schuyler, Field Book of American Trees and Shrubs, G. P. Putnam's Sons, New York, N. Y.

Harlow, William M., Trees of the Eastern and Central United States and Canada, Dover Publications, Inc., New York, N. Y., 1957.

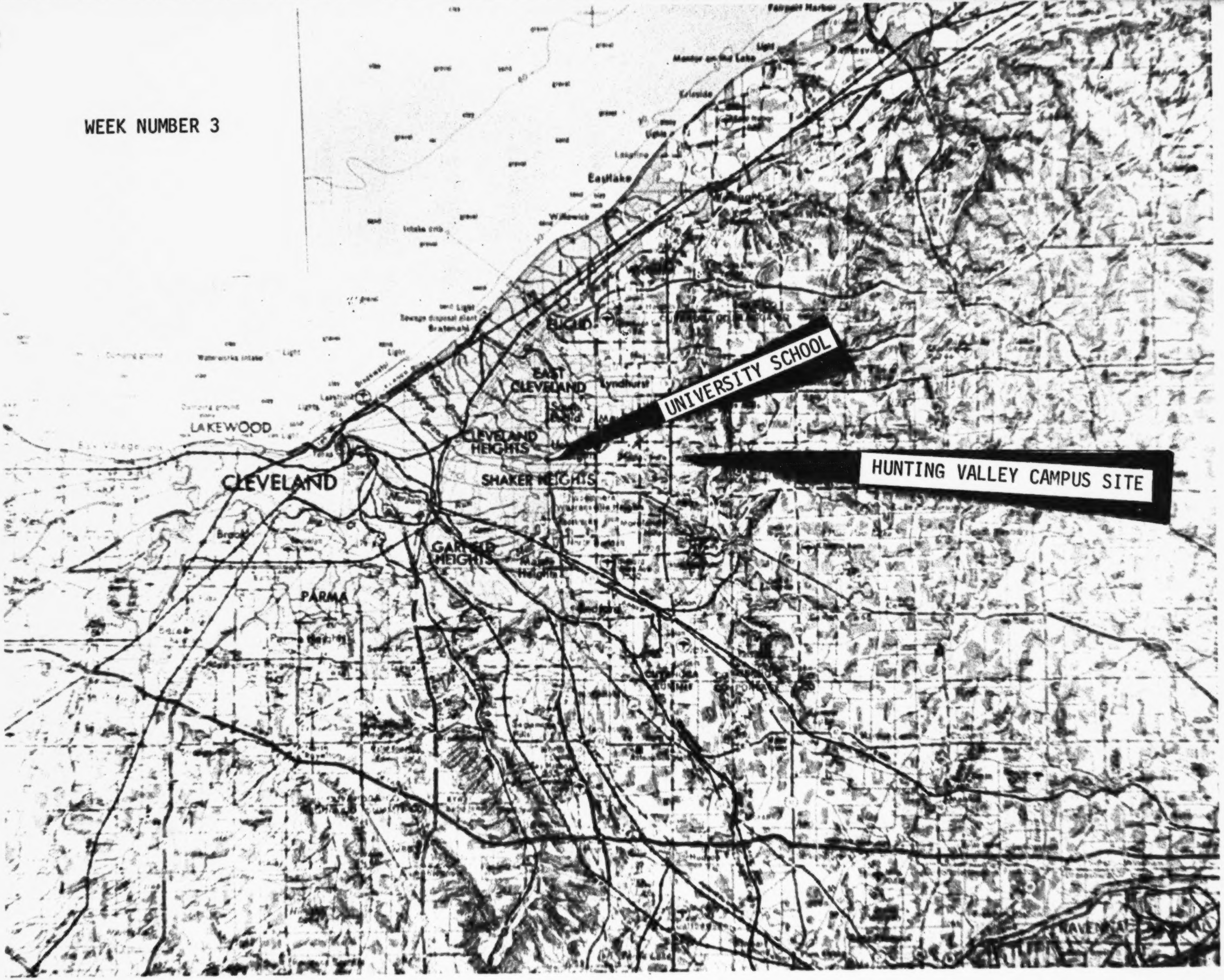
Benton, Allen H. and William E. Werner, Jr., Manual of Field Biology and Ecology, Burgess Publishing Company, Minneapolis, Minnesota, 1965.

Berman, William, How to Dissect, Sentinel Books Publishers, Inc., New York, N. Y., 1961.

Benton, Allen H. and William E. Werner, Jr., Field Biology and Ecology, McGraw-Hill Book Co., New York, N. Y., 1966.

Phillips, Edwin A., A Laboratory Block in Field Ecology (BSCS), D. C. Heath & Co., Boston, Mass., 1965.

WEEK NUMBER 3


UNIVERSITY SCHOOL
HUNTING VALLEY CAMPUS SITE
CLEVELAND
LAKEWOOD
EAST CLEVELAND
CLEVELAND HEIGHTS
SHAKER HEIGHTS
GARFIELD HEIGHTS
PARMA
EUCLID
Eastlake
Willowick
Lyndhurst
Mentor on the Lake
Fairport Harbor

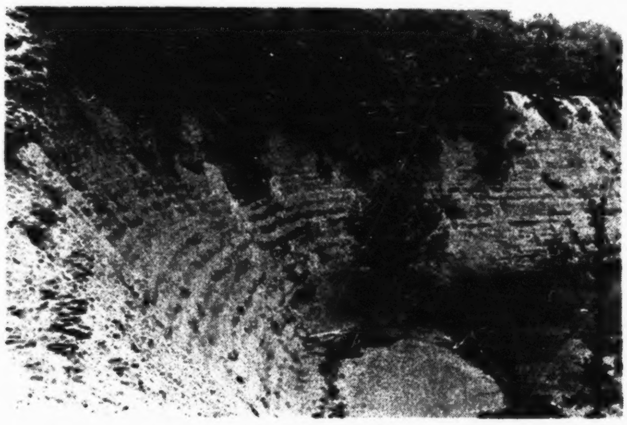
The Third Week

We thought so far that we had been frightfully scientific:

(1) formulating theories to account for Cleveland's physiognomy;
(2) checking to see whether the theories actually explained known facts;
(3) testing the theories' validity to see whether or not they actually predicted events;

and we had, indeed, established an understanding of how we got many different niches in the Cleveland environment. But we had not attempted to develop the nature and relationship of the forces that had created these reorganizations and relocations of small particles of matter. So before continuing from soil and terrestrial foundations to aquatic communities, we took a crack at it this way:

FIRST, we looked back at one of the macroscopic systems we had seen in the first week:



Since every boy had been at this point on Rocky River, he realized the water had been higher and broader - a long time ago. He also had seen that each stratum of rock could be made of different materials or arrangements of the same materials. Therefore, the missing rock had been carried to different places at different rates and times.

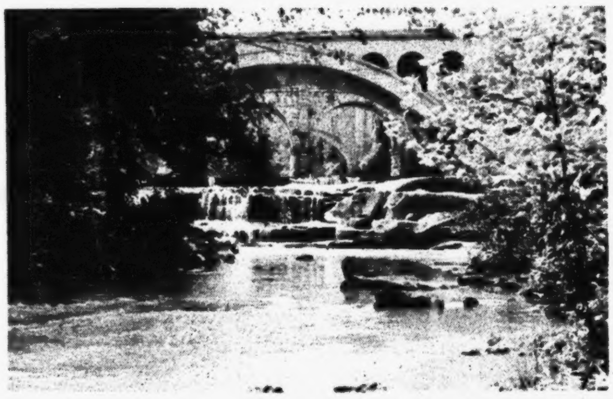
Not only would we want to know how this site differed from those above and below, but also from the same elevations in the Chagrin, Grand, and Cuyahoga Rivers. And we would look at those and more in the remaining weeks.

BUT (1) Just how fast does this form of erosion take place?
(2) How much water is needed and at what speeds must it travel?
(3) How does other material in the water affect cutting efficiency?
(4) How will the pattern of erosion change?
(5) Where does the water come from?
(6) What aspect of this changing system can be controlled by man?
(7) How is this part of a larger system while also comprised of smaller systems? What are they? What properties do they have?

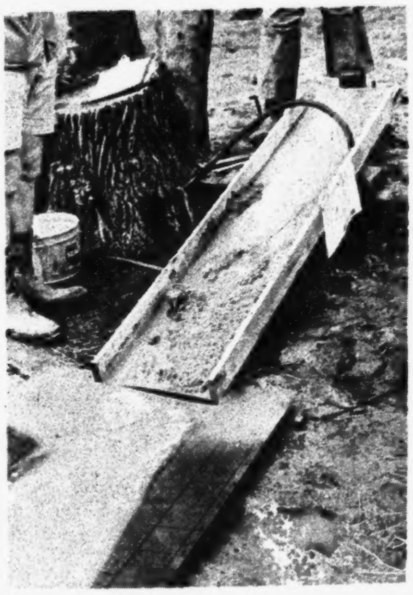
. . . in fact, it looked as though we'd have to take that system apart, bit by bit, to tackle these questions. And so . . .

3rd Week

SECOND, we tried to isolate characteristics of that system with models:

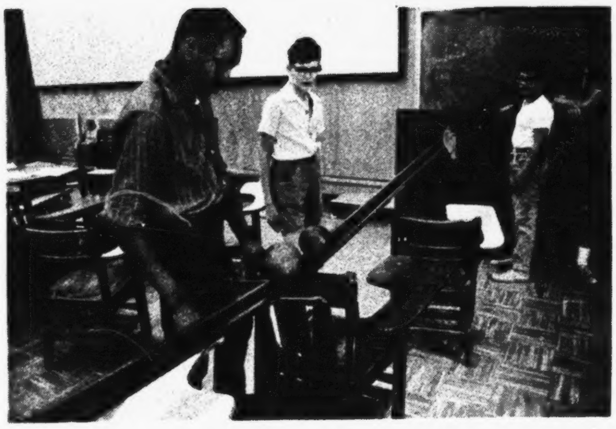


If the water above that point on the Rocky River



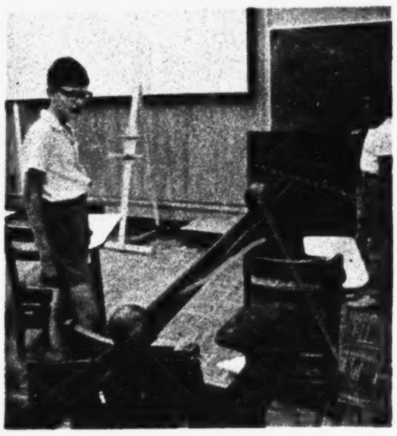
is analogous to any other body of water at a greater elevation,

in any volume,



or, if it is analogous to any equal mass at a greater elevation,

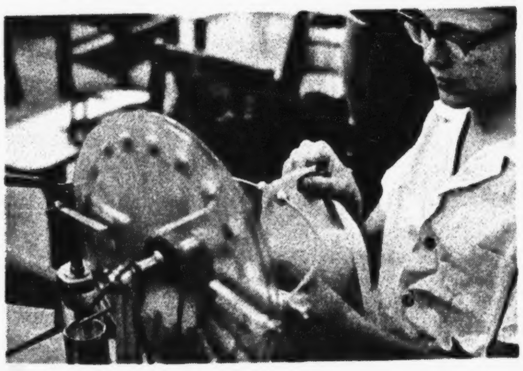
then we can measure controlled characteristics of those other bodies of water,



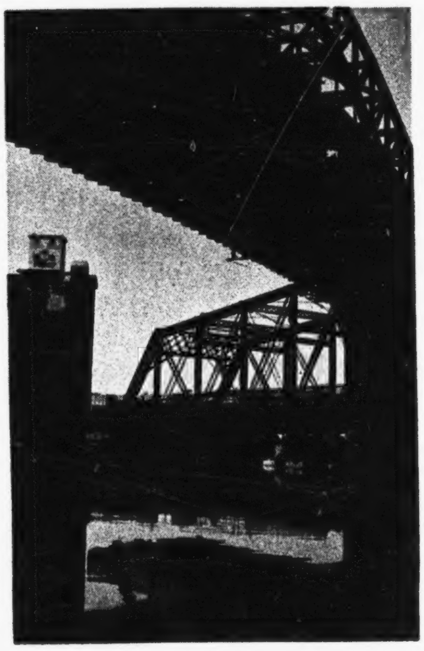
or those other masses. (At least it looked that way!)

Interestingly, not only could all that stored energy get moving and do work to

"move mountains" (which we would see later at Rockside Road Reclamation Project),



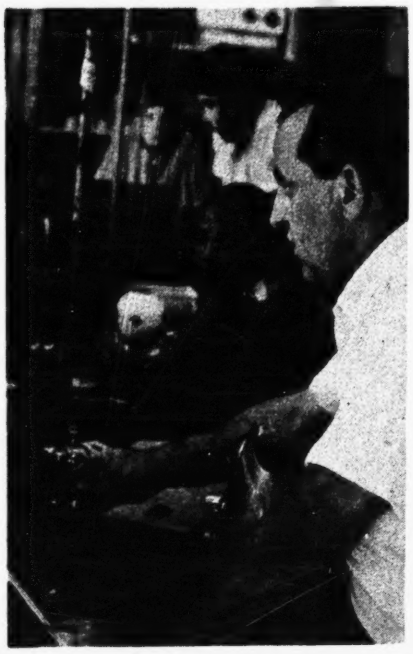
but it could also turn wheels to generate electricity . . .



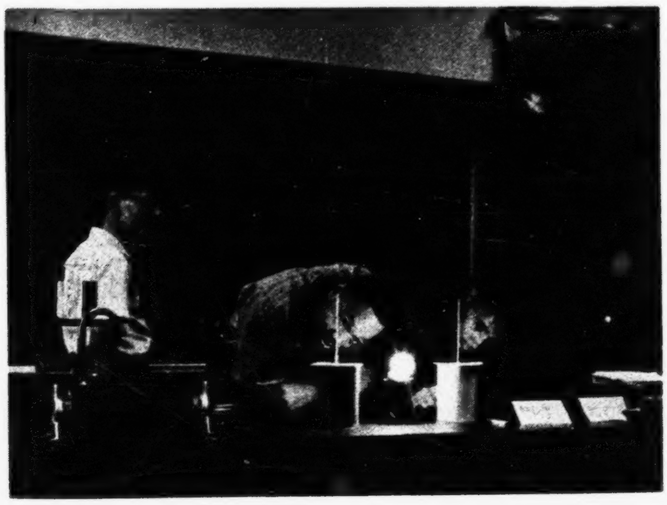
to run machines - for all kinds of things, and reasons.

3rd Week

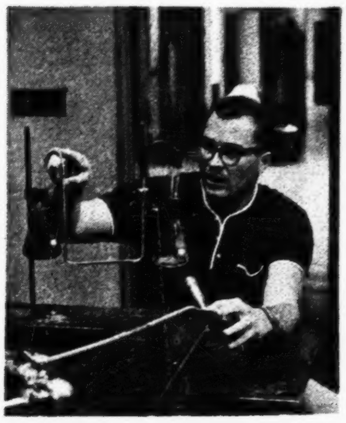
THIRD, we imagined how that place at Rocky River was a consequence of



Sunlight - lab style,



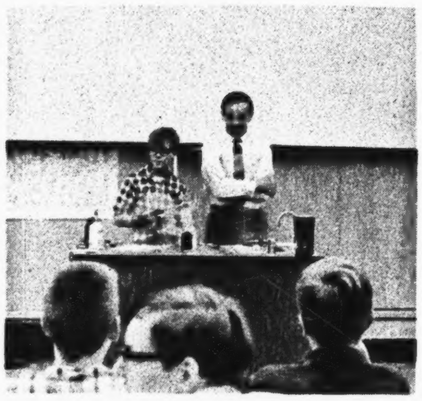
striking different parts of the Earth's surface,

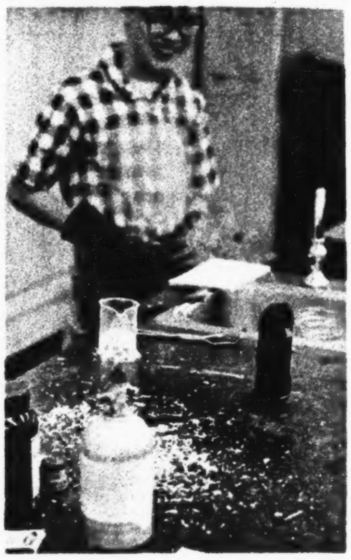


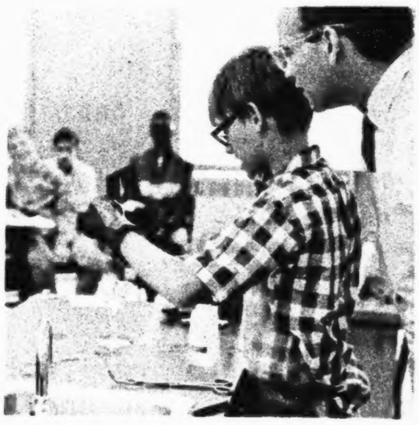
producing heat, in turn evaporation, air currents, and

even changes in all those plants we started back in the first week.

And so we could measure in the laboratory, but only guess in the field, how the amount and kind of light on the earth could affect this one point in time and space.







Darrel T. Eubank, E. I. DuPont Company, and son, John.

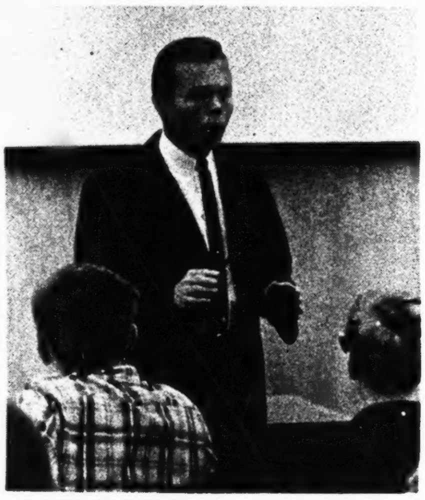
And hydrolysis, lab style. We saw very small amounts of different chemicals reacting slowly, rapidly, giving smoke, light, heat, sound - and new products. Many of these reactions required water. Now, if that lab water was like the Rocky River water . . . hmmm.

And (panting) FOURTH, we saw effects on that Rocky River site which had been started elsewhere. Obviously amount of rainfall, sunlight, and wind could influence our subsystem.

With two films,

(1) "Our Mr. Sun", Ohio Bell Telephone Co., Cleveland. (Comprehensive treatment of what is known about the sun.)
(2) "Eyes in Outer Space", c/o Dick Goddard, WJW-TV meteorologist, Cleveland. (Weather influences and future control.)

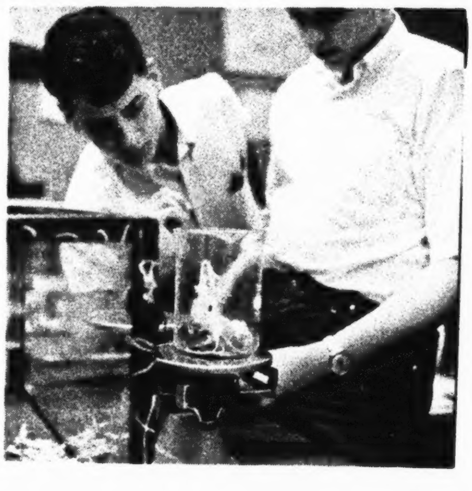
and Dick Goddard,



we saw combined forces operating on all of the matter at the point.

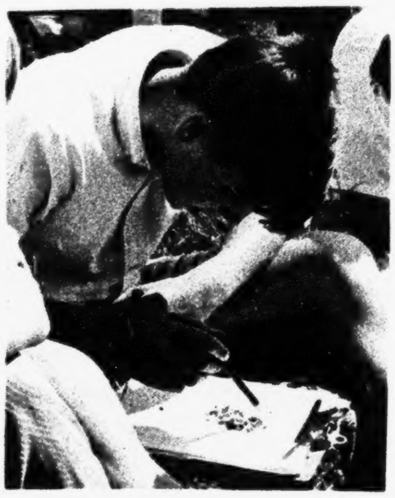
FINALLY, we wanted to create some thoughts about the amounts and directions of energy flow through our Cleveland environment. Within the context of this study approach, we thought it would be appropriate via BIOMASS measurements.

In fact, that's why we had started weighing mice in the first week - to follow their food:weight gain ratios.



But for real data (and because the mice were all over the school, eating who-knows-what), we went back to the Hunting Valley quadrats . . .

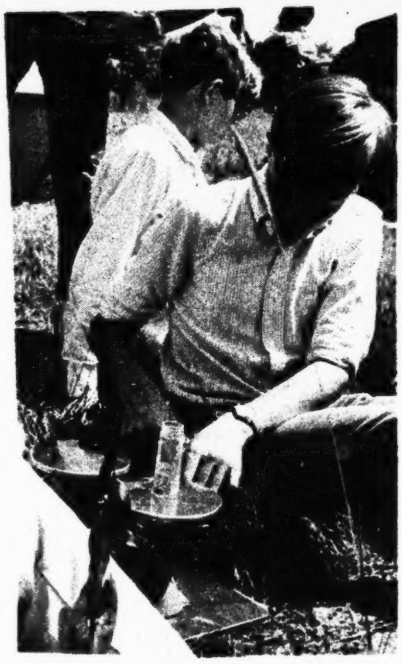
. . . and first trapped for mice around the quadrats, then



swept them for insects,

carefully collecting

a surprising number and kind,



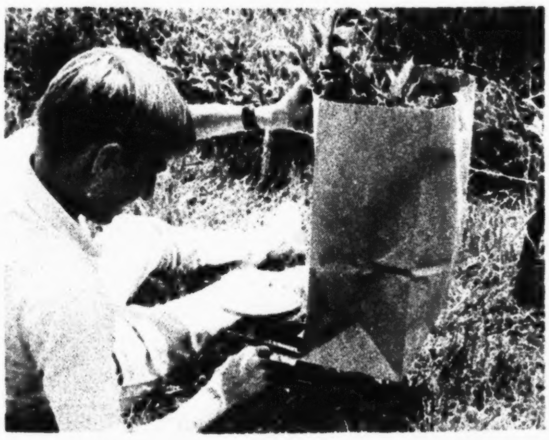
and then weighed them.

So we saw approximately the mouse: insect ratio; now we needed the mouse: insect:plant ratio.

That meant cutting all the vegetation in 1 meter x 1 meter squares, weighing, multiplying by 100, and comparing with the mouse and insect weights.

If this ratio continued, we predicted there could not be very many mouse predators in Hunting Valley.

From these comparisons, we got the ideas of limits and energy conversion efficiencies. Hopefully, this had something to do with gas, oil, timber, fissionable and other forms of matter - by inference.



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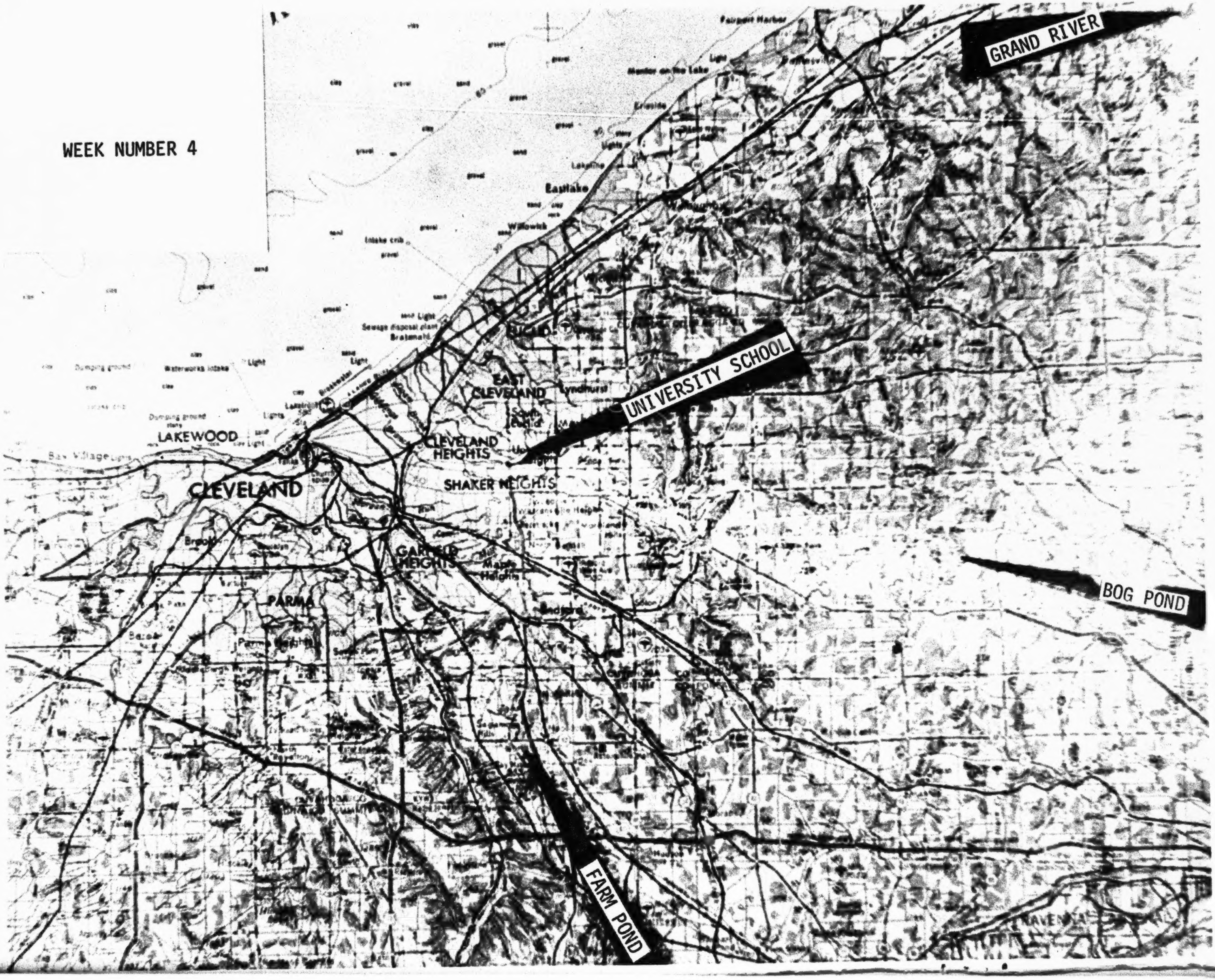
WEEK NUMBER 4

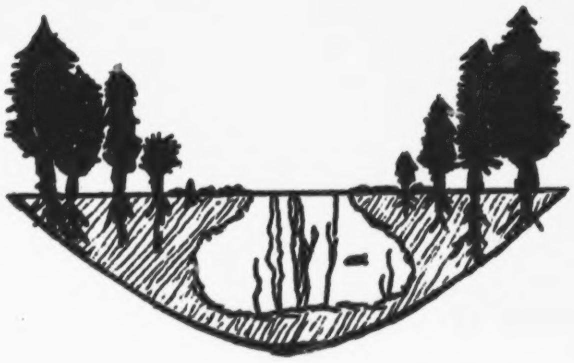

GRAND RIVER
UNIVERSITY SCHOOL
BOG POND
FARM POND
Fairport Harbor
Mentor on the Lake
Eastlake
Willowick
Lakeline
Intake crib
Sewage disposal plant
Breakwater
Waterworks intake
Dumping ground
Euclid
EAST CLEVELAND
Lyndhurst
LAKEWOOD
Bay Village
CLEVELAND
CLEVELAND HEIGHTS
SHAKER HEIGHTS
GARFIELD HEIGHTS
Maple Heights
PARMA
Parma Heights
Bedford
RAVENNA

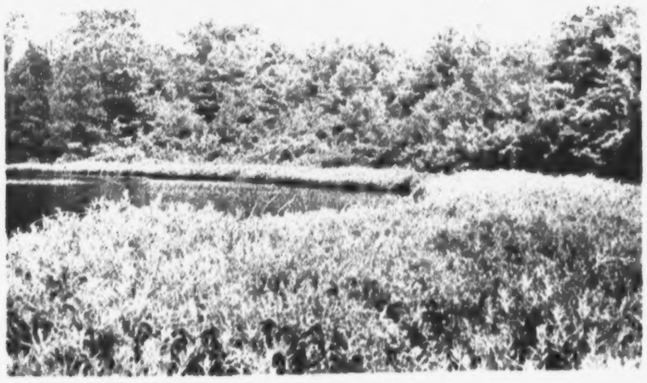
The Fourth Week

We've seen and measured some of the materials and forces involving change. If we could go to points A, B, and C . . . and put them in the correct time sequence, then we could watch and record the succession of change.

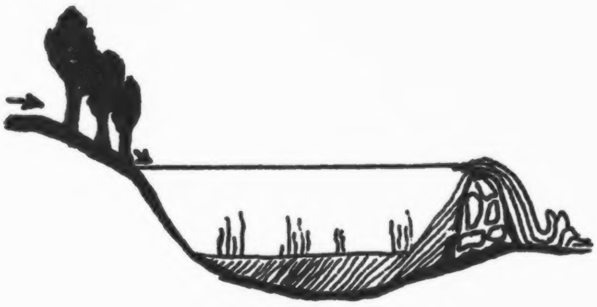
It seemed especially appropriate in Cleveland
to focus this study around AQUATIC COMMUNITIES.

A BOG: Highly acidic, oxygen and calcium deficient, only a few living forms can take this rigor: sphagnum moss, insectivorous sundews, cranberry, leatherleaf. And even these slowly succumb. Finally, accumulating and becoming overgrown by the terrestrial climax community, they form peat, often used for domestic fuel.





A POND: Unlike the BOG, some water flows through, and a much greater diversity of organisms moves in. Depth of water, air temperature, sun exposure, basin type, produce variations - and this was a fascinating one at Cyrus Eaton's Farm.

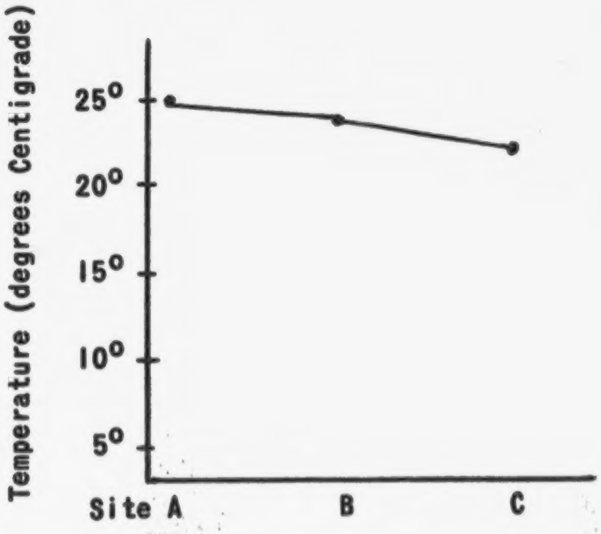


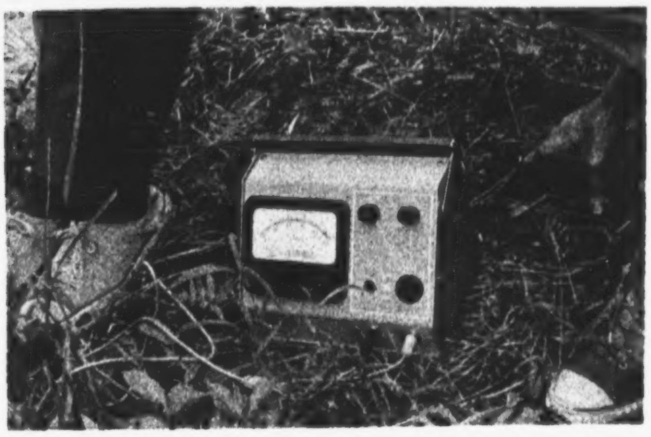
A STREAM: All water changes all of the time at this point, and at different depths and distances from shore we found many kinds and numbers of plant and animal types that we had not seen either in the bog or the pond.

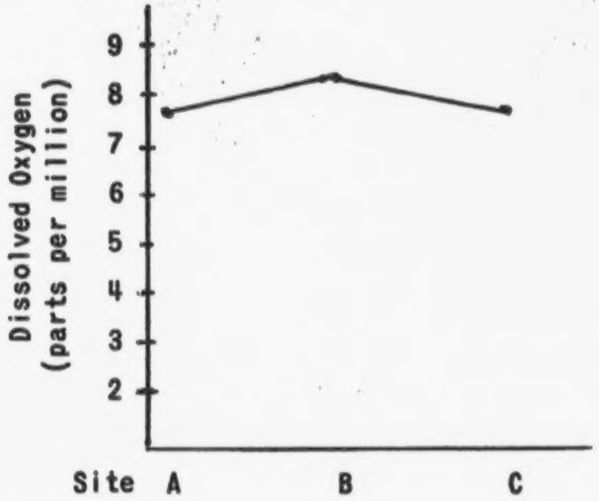
4th Week

(This seems like the time to duck responsibility for accuracy! Well, this is what we did, anyhow.)

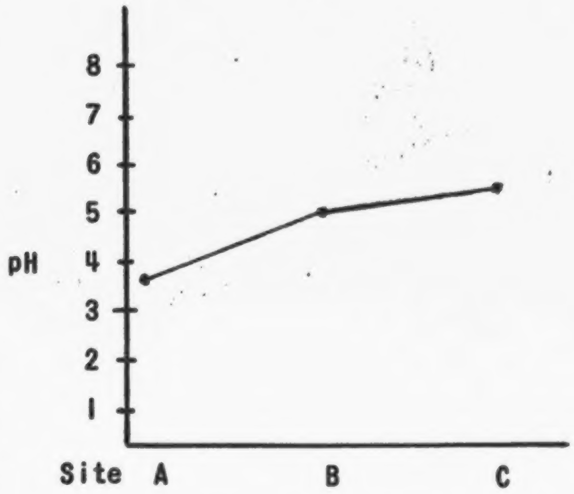
We arrived at the pond . . .



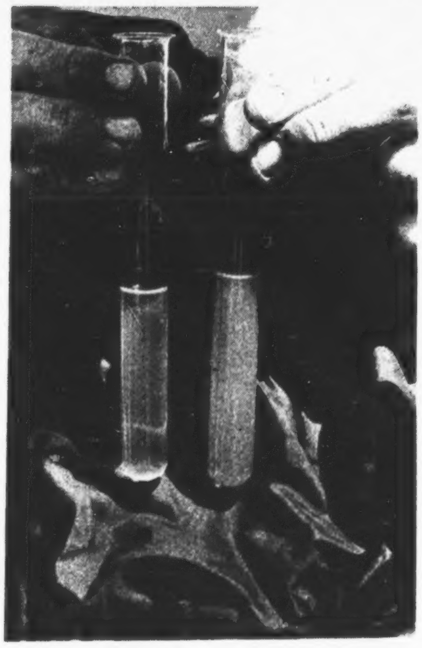




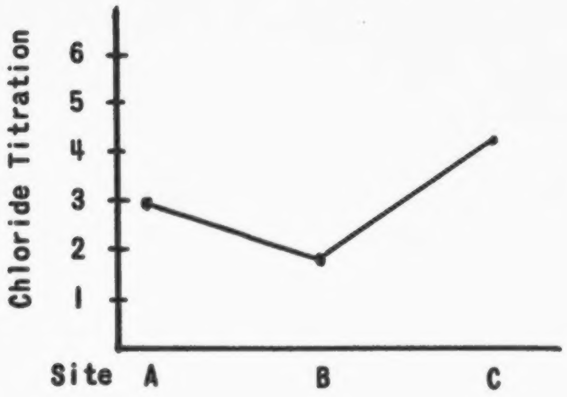
measured temperature and
dissolved oxygen . . .
and pH,



and turbidity,



and halogens . . .



and we discovered . . .

plankton,

mollusks,

vertebrates,

. . . and other things!

And that's how it looked to us . . .

And this is how it looked to the Cleveland Plain Dealer.

4th Week

City Boys Discover Nature Through Science Project

THE 40 BOYS in University School's Summer Science Project who delved and dipped into the depths of the silty Grand River in Ashtabula County had something to say about how common laboratory procedures [illegible] in [illegible] order.

They were much too busy to say it though.

As part of their summer study of ecology—the relationships between the parts of an environment — they dredged mussels, darters, crayfish and finger clams from the river bottom, skimmed whirligigs (a kind of beetle) from the surface, took the river's temperature, measured how much oxygen it has, how muddy it is, how much phosphate from the land has found its way in, and how acid the water is.

They did a lot of swimming too. And they trapped a toad, a snake, a turtle and various bugs on the river banks.

After a box lunch eaten on the river bank, their paraphernalia, including pails full of water creatures, was loaded back into the buses. At the school it was all classified for comparison to other water areas they have studied.

THE PROJECT is cosponsored by University School, the Natural Science Museum and the Cleveland public school system.

The participants come from city and suburban junior high schools and the teaching staff represents city and suburban public schools as well as boys' and girls' private schools.

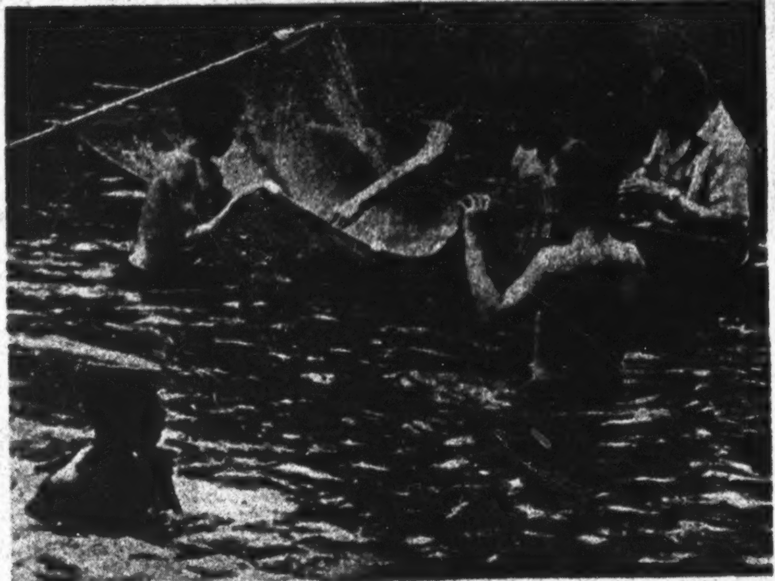
Five student aides are high school boys chosen from the Museum's Future Naturalist program.

This is the third year that University School has run a city-suburban summer institute but the first that it has moved to an [illegible].

Purpose of the program is to develop consciousness of the land as a resource. It will be adapted for the regular ninth-grade science classes at U. S. next year and probably continued in succeeding summers.

Jonathan E. Ingersoll and Joseph H. Chadbourne, U. S. faculty members, are codirectors of the project.

TWO BOATLOADS of boys went up river from the John Carroll University property on Grand River to explore other areas. The pole held by the boy in the stern of the boat



A SEINE NET is used to collect plant and animal life from the river bottom. The man at the right, wearing waders, is William Coleman, Lakewood science teacher.

TEACHER aide William Schlesinger, a U.S. student, operated a device to test water temperature and oxygen content but said he'd rather do it the hard way.

Pictures by Plain Dealer
Chief Photographer
Ray Matjasic

[illegible] WADED in fully clothed but luckily had

4th Week

RESOURCES

Field Sites

A spruce bog (private property of Natural Science Museum).

A farm pond (private property of Cyrus Eaton).

A river site (private property of John Carroll University).

Films

"The Spruce Bog", National Film Board of Canada, from Kent State Audio-Visual Center, Kent, Ohio. (Succession of plant and animal forms in northern bogs.)

"Limnology, the Study of Lakes", American Institute of Biological Sciences, Kent State Audio-Visual Center, Kent, Ohio. (Lake structure, seasonal changes, effect on living things. Techniques and methods.)

"The Restless Sea", Ohio Bell Telephone Company, Cleveland, Ohio. (Biology, chemistry, geology of oceanography.)

"Algae", Indiana University, Kent State Audio-Visual Center, Kent, Ohio. (Straightforward survey of the phylum with the various habitats.)

"Mollusks; Adaptive Radiation", Encyclopedia Britannica Films, Kent State University Audio-Visual Center, Kent, Ohio. (Variations that correspond to different environmental situations.)

References

Eddy, Samuel, and A. C. Hodson, Taxonomic Keys to the Common Animals of the North Central States, Burgess Publishing Co., Minneapolis,

Benton, Allen H., and William E. Werner, Jr., Manual of Field Biology and Ecology, Burgess Publishing Co., Minneapolis, Minn., 1965.

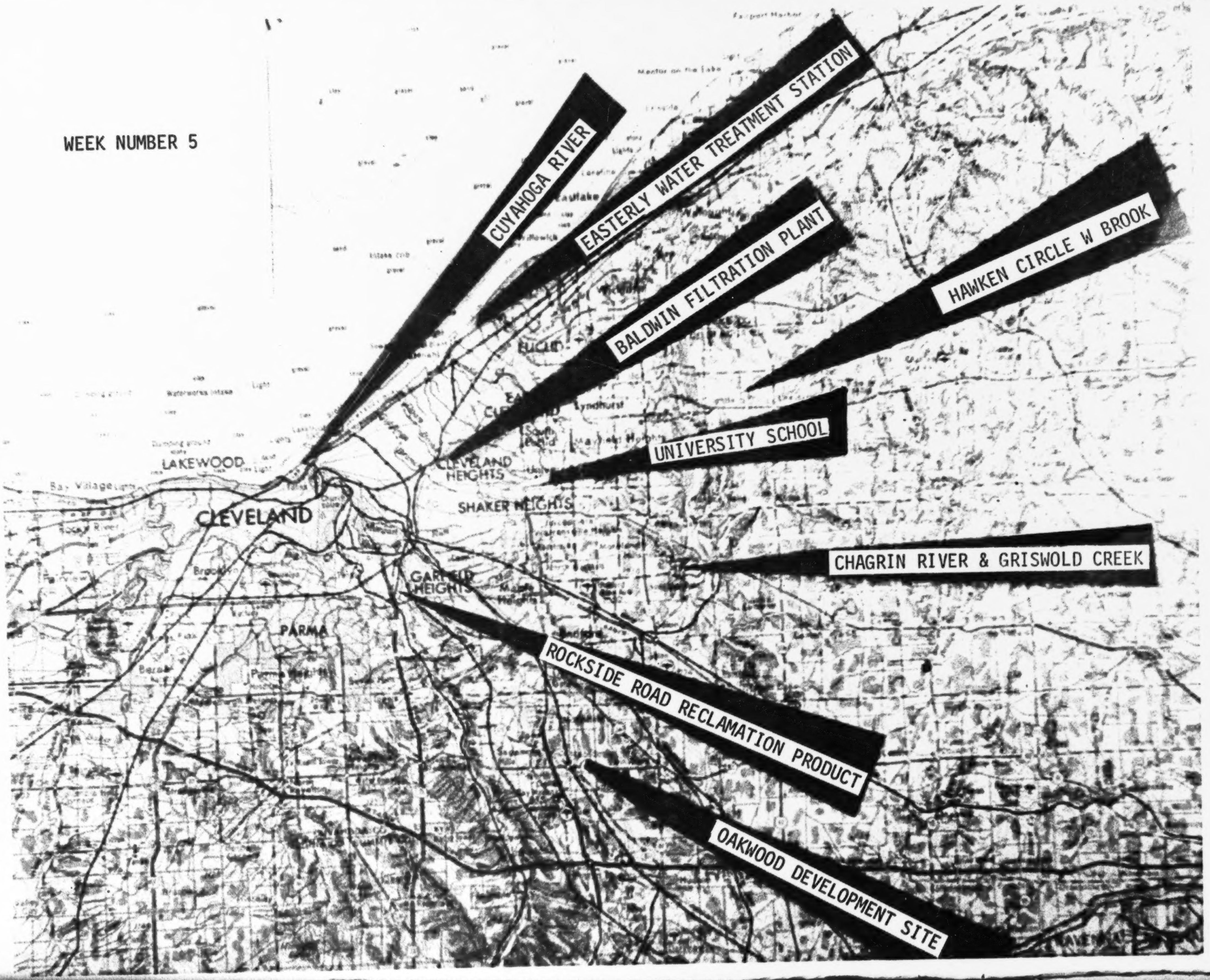
Benton, Allen H., and William E. Werner, Jr., Field Biology and Ecology, McGraw-Hill Book Company, New York, N. Y., 1966.

Needham, James G., and Paul R. Needham, A Guide to the Study of Fresh-Water Biology, Holden-Day, Inc., San Francisco, Calif., 1962.

DeWaard, E. John, What Insect Is That?, American Education Publications, Inc., Columbus, Ohio, 1965.

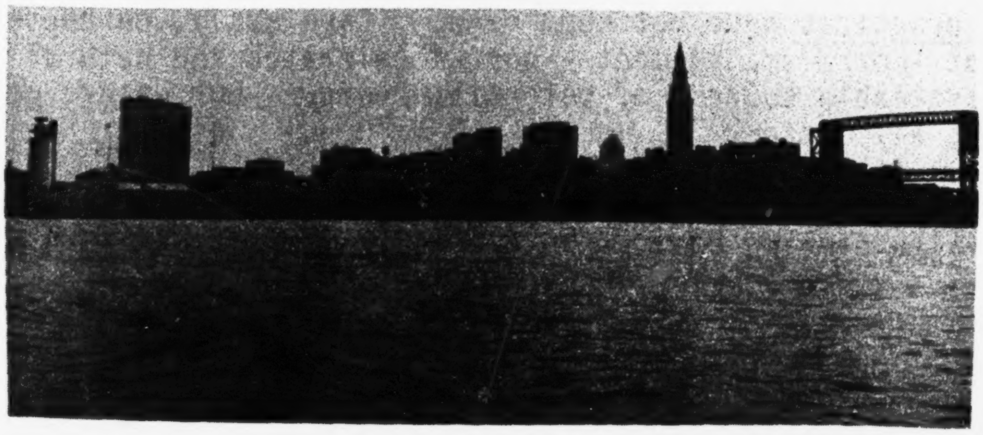
Palmer, C. Mervin, Algae in Water Supplies, Public Health Service, Publication No. 657, U. S. Government Printing Office, Washington, D. C., 1959.

WEEK NUMBER 5


CUYAHOGA RIVER
EASTERLY WATER TREATMENT STATION
BALDWIN FILTRATION PLANT
HAWKEN CIRCLE W BROOK
UNIVERSITY SCHOOL
CHAGRIN RIVER & GRISWOLD CREEK
ROCKSIDE ROAD RECLAMATION PRODUCT
OAKWOOD DEVELOPMENT SITE
LAKEWOOD
CLEVELAND
CLEVELAND HEIGHTS
SHAKER HEIGHTS
GARFIELD HEIGHTS
PARMA
EUCLID
Lyndhurst
Bay Village
Waterworks Intake
Mentor on the Lake
Fairport Harbor
Eastlake

The Fifth Week

And then we looked at the changes made by man . . .



and we began to see a need for and to develop a feeling about land use. We remembered how long it took to form, shape, and remake our Earth. And this week we saw how quickly forces work to redistribute our Earth's potential.

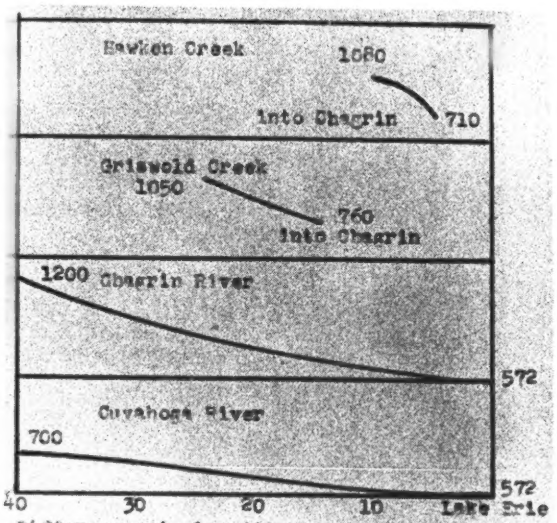
From a pond at Hawken School . . .

we saw water at the beginning of the watershed

and, as we followed its downward flow,

it moved faster, slicing into the earth,

to join the Chagrin, and then Lake Erie. We used this profiling method and compared pH, temperature, dissolved oxygen, turbidity, numbers of organisms, flow volume, and shore character at Griswold Creek, Chagrin, and the Cuyahoga.



Differences in location, origin, slope, volume, use, content, velocity ....

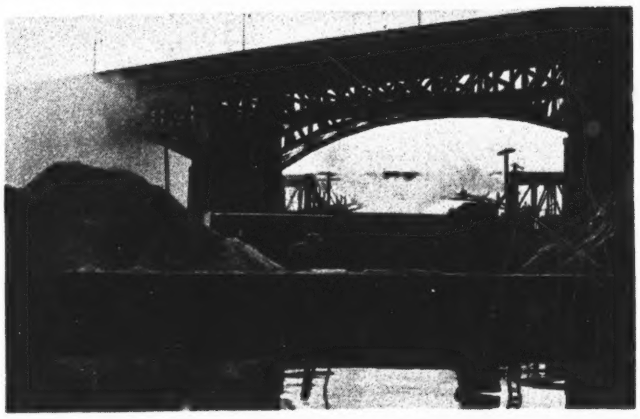
5th Week

We realized that although the Earth has changed, and that our ethics have changed, our practices have not kept pace. Carelessly, perhaps unwittingly, our management - or mismanagement - has accelerated the natural reduction of the Earth's available sources of potential energy - our water, gas, oil, timber - in fact, all matter.

As we traveled up the Cuyahoga on the Wan-El's fishing boat,

we measured the amount of planktonic life in the water

and saw the demands placed upon that water by man.



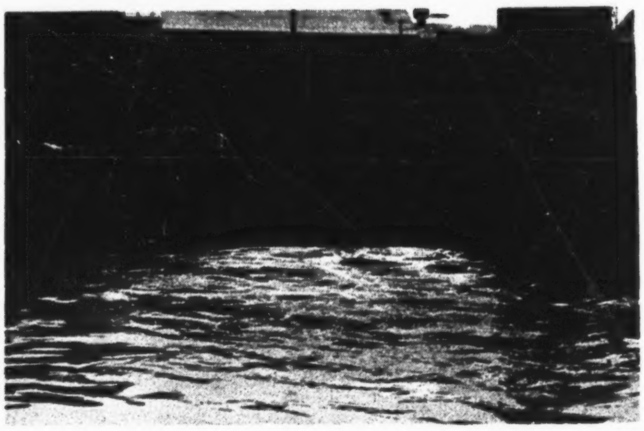
5th Week

We found that parts per million of dissolved oxygen dropped abruptly as we went upstream, and water temperature increased steadily.

And we no longer found living organisms . . .

as we saw the significance of the Cuyahoga

to water traffic,

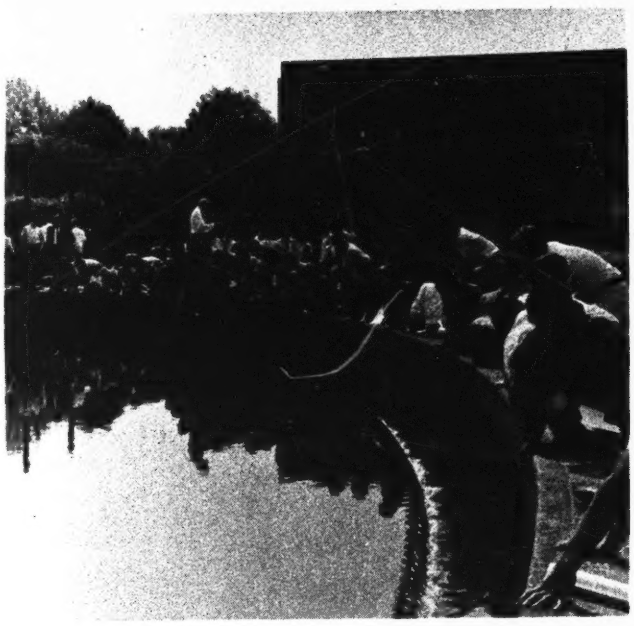


industrial growth,

sportsmen, waste transport - in fact,

all of Cleveland.

And on the debit side . . .



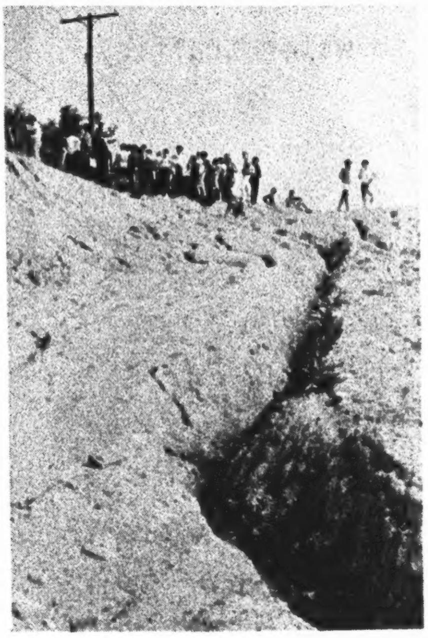
Frank Biehl, Industrial Waste Div., Water Pollution Comm.

we visited the Baldwin Water Filtration plant to see how Lake Erie water becomes potable, and the Easterly Sewage Treatment plant to learn how that water is used before it goes back to Lake Erie.

And we looked over a conservation project -

Rockside Road Reclamation Project, Soil Conservation Service, USDA.

and a housing development site that seemed to be causing a bit of a problem!



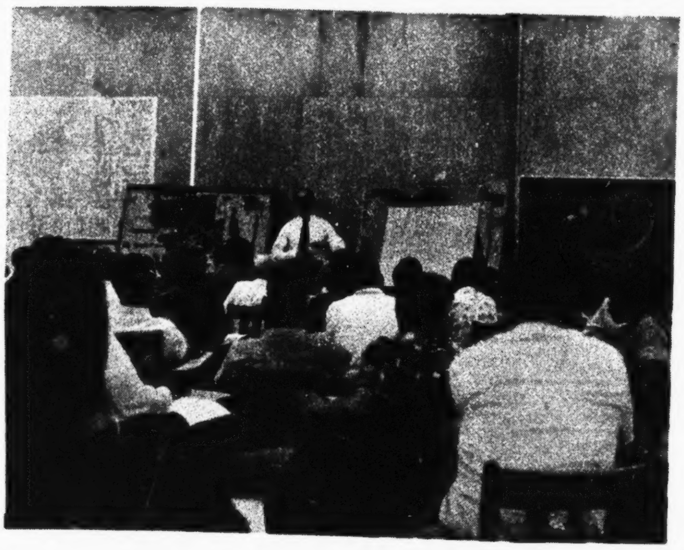
Councilman Walter A. Tiburski, Oakwood.

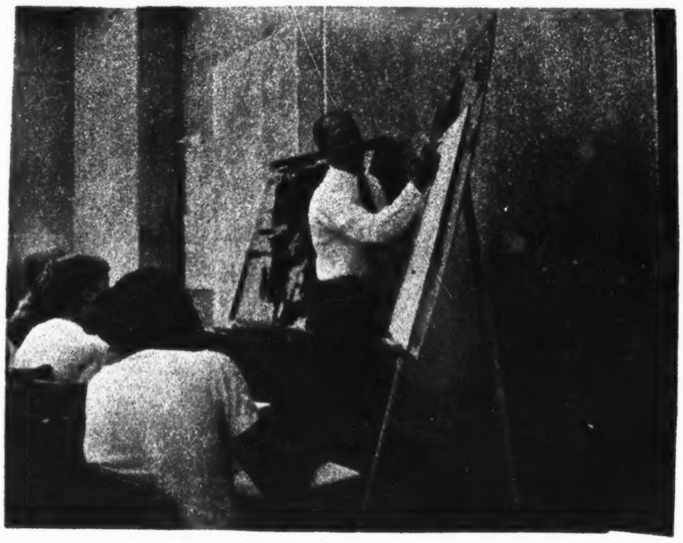
5th Week

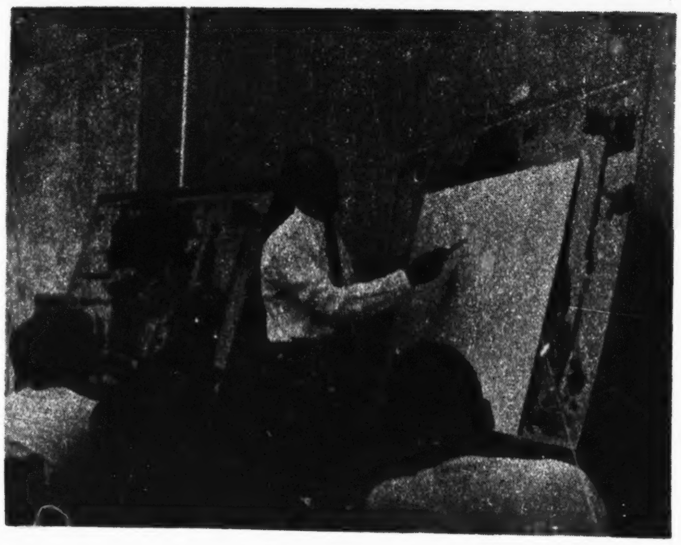
FINALLY, we were ready for a practical application of our knowledge:

1. A brand, spanking-new school was being planned for that 175-acre site on which we had placed our quadrats during the first and third weeks.
2. The architects were just beginning to plan the relationship of the buildings to the terrain - slopes, drainage, soil, trees, and use for education.
3. What considerations could we recommend?

Peter van Dijk (Schafer Flynn & van Dijk, Architects), in charge of planning and designing that school, transformed ideas into reality . . .

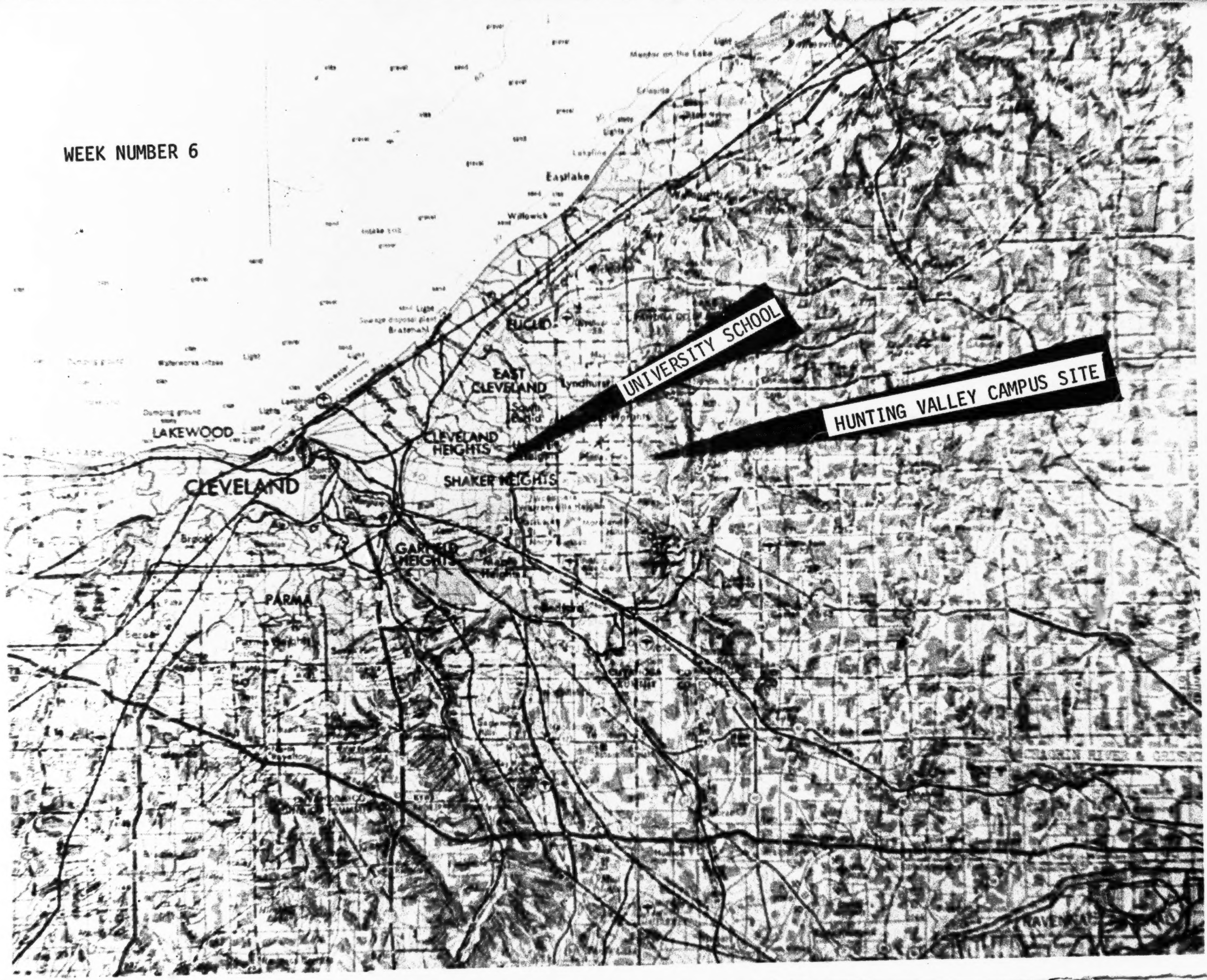






Describing here the significance of land slope to building design and construction costs, he offered to consider our recommendations for site use. And so we questioned, and thought, and planned - a detailed study of the Hunting Valley school site.

* * *

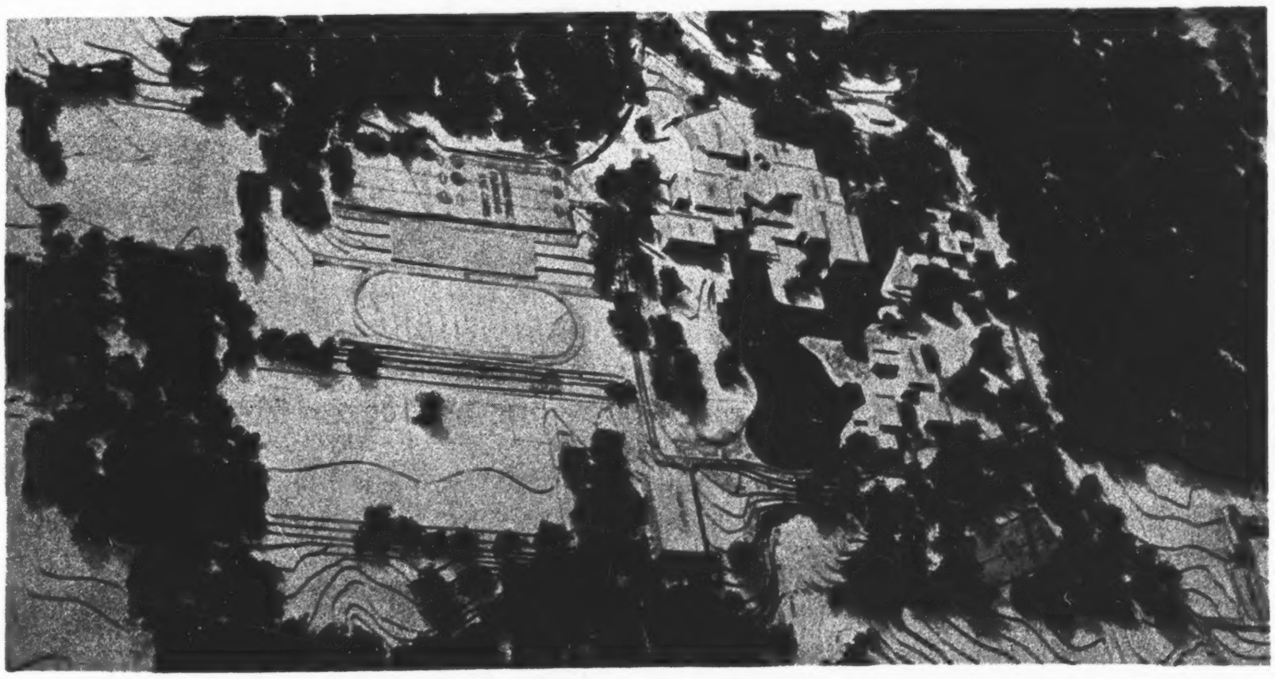


WEEK NUMBER 6

UNIVERSITY SCHOOL
HUNTING VALLEY CAMPUS SITE
CLEVELAND
LAKEWOOD
EAST CLEVELAND
CLEVELAND HEIGHTS
SHAKER HEIGHTS
GARFIELD HEIGHTS
PARMA
EUCLID
Lyndhurst
Eastlake
Willowick
Mentor on the Lake

The Sixth Week

Here was our test!



This was a preliminary concept of Schafer Flynn & van Dijk's design for a new, four-year high school on 175 acres of farmland, horse trails, apple orchard, and Beech-Maple climax forest. We had studied our terrestrial communities here in the second week and biomass relationships in the third. And now we had been invited to make recommendations to the planners!

We tried to recall the evidence from Whipps Ledges and Rocky River that rocks and water interact slowly to form soils, and that

these can be overgrown with plants, in a predictable pattern, first primitive and sparse, then more luxuriant, and that these can

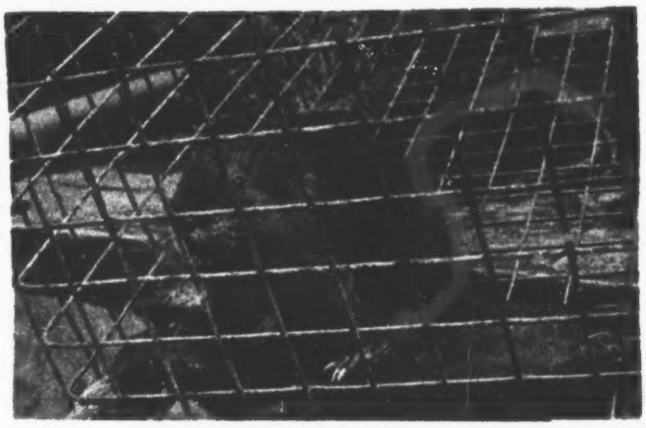
be inhabited then by animals, in a relationship determined by available biomass.

BUT . . .

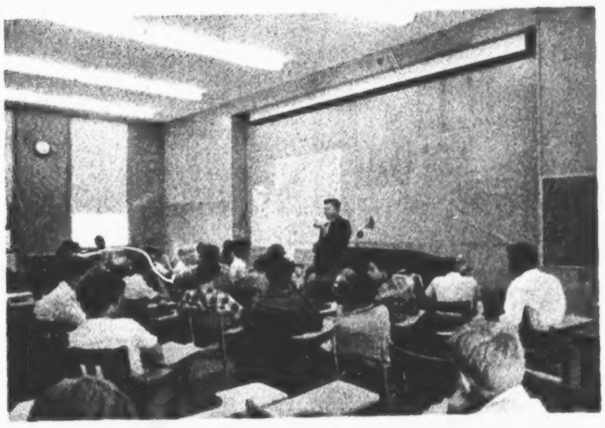
. . . this can be a very delicate proposition:

A little too much slope, or not enough cover; or too much rain, and not enough retention - as the Soil Conservation Service was trying to demonstrate at Rockside;

or bulldozer blade . . .



. . . can make a guy feel like he's lost control over the environment!



So we imported a little professional help, i.e., Mark Hardenberg, architect and city-planner, Dalton-Dalton Associates Inc. He suggested we consider population and traffic patterns, water and waste disposal, utilities, costs, and that with this many variables, there just might be room for some alternatives.

He challenged us to use wisdom in developing our "land ethic".

And so we went to work, perusing aerial survey photographs and contour maps; preparing overlays; and organizing into groups according to our interests:

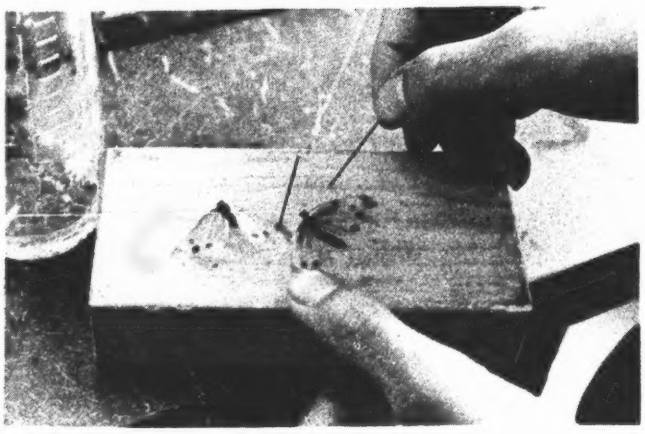
ONE group prepared fixed positions from which to make permanent photographs of the changing land forms.

A SECOND group made succession plots, a living graph of the growth rates.

A THIRD surveyed the water.

6th Week

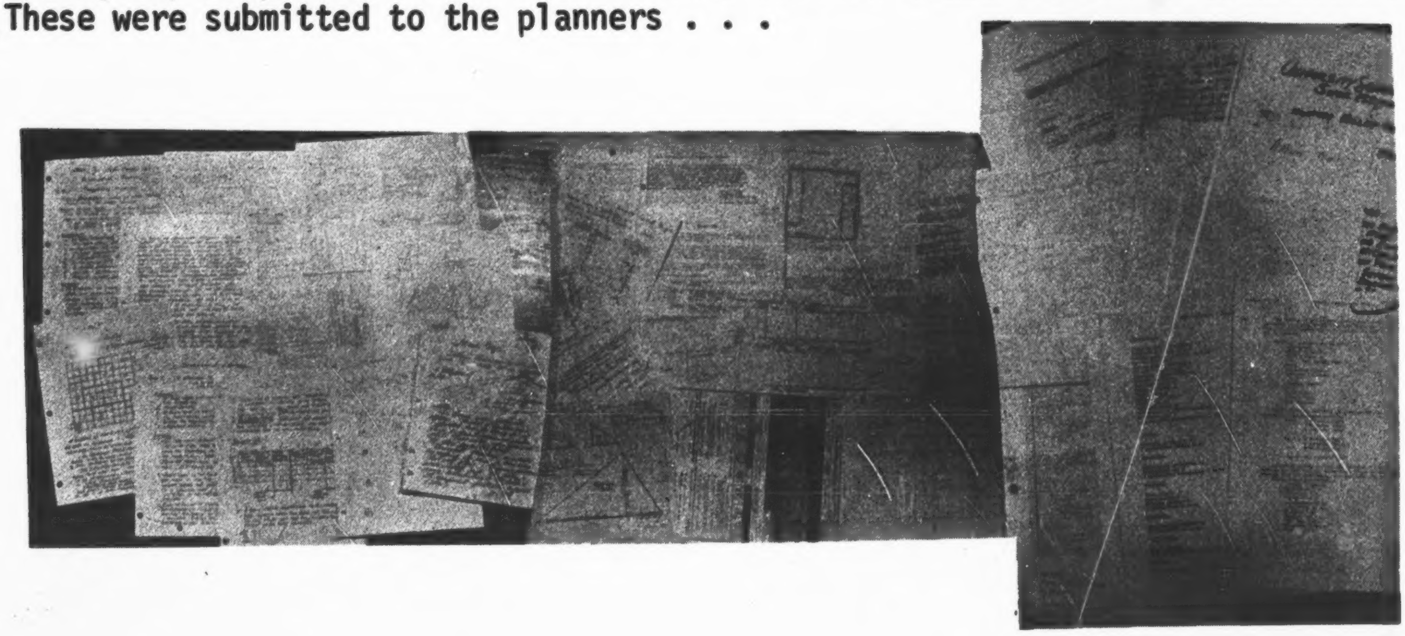
A FOURTH collected, described, and reported terrestrial plants.



And a FIFTH . . . the insects.

And a SIXTH made a nature trail.

Each group compounded their studies into written summaries and recommendations. These were submitted to the planners . . .



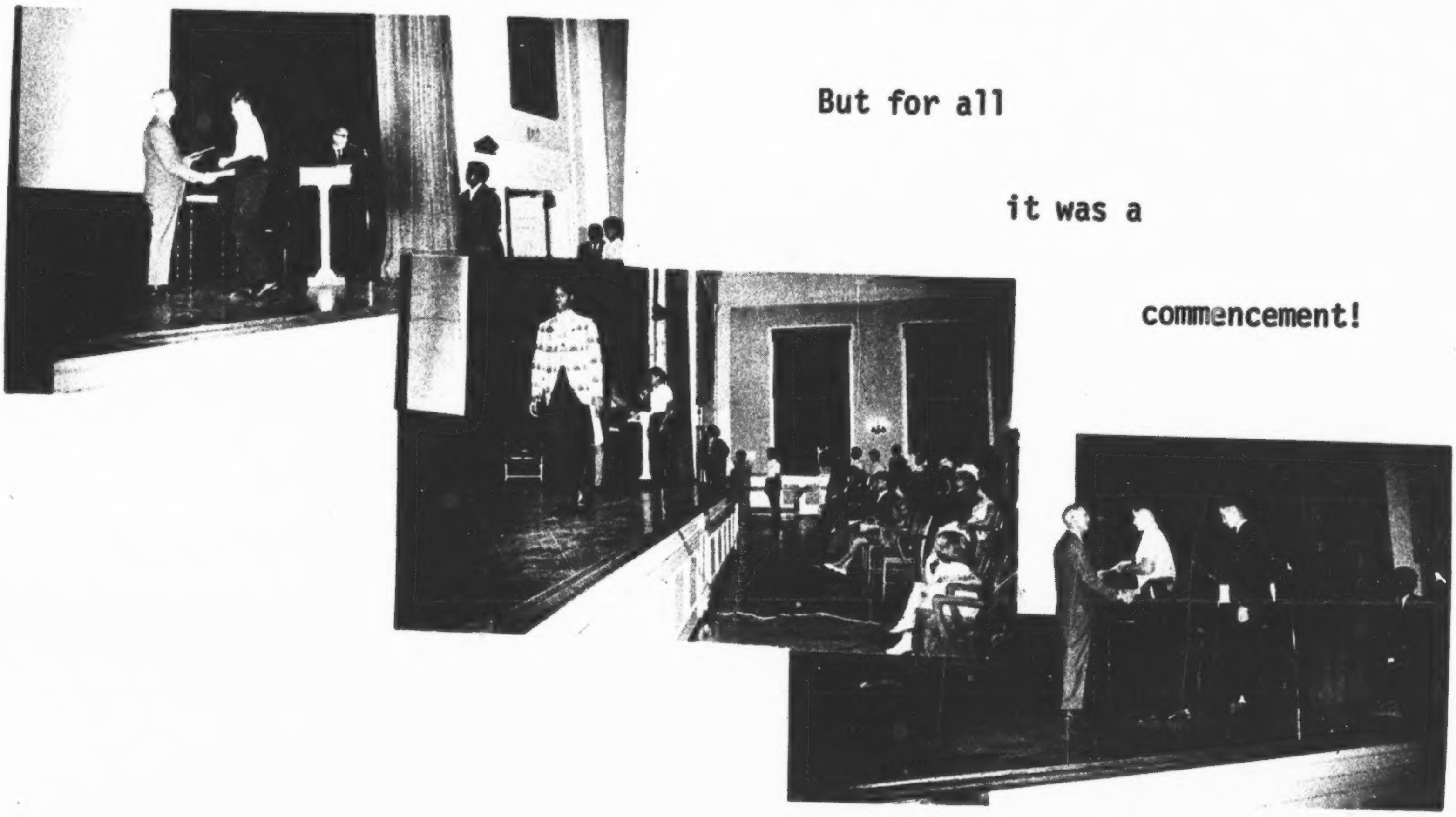
6th Week

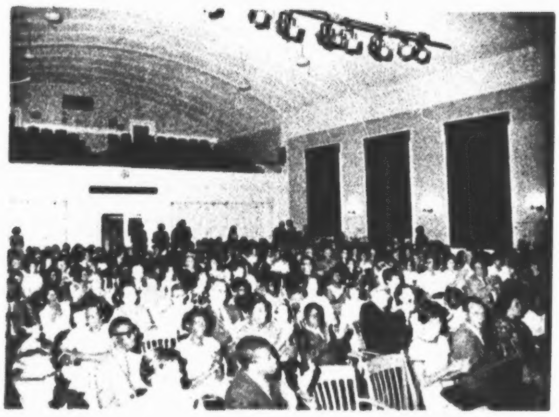
AND JUST THAT SUDDENLY IT WAS OVER . . . at least the Summer Project.

But for all

it was a

commencement!





AND THERE IS NO END

6th Week
6

RESOURCES

Film

"Applied Ecology", produced by University Films for McGraw-Hill Book Co., American Institute of Biological Sciences, Unit IX, Film Course in Modern Biology. Kent State Audio-Visual Center, Kent, Ohio. (Description of the eight soil types with the conservation procedures required to maintain their usefulness.)

References

Thomas, William Sturgis, Field Book of Common Mushrooms, G. P. Putnam's Sons, New York, N. Y., 1948.

Groves, J. Walton, Edible and Poisonous Mushrooms of Canada, Research Branch, Canada Department of Agriculture, Ottawa, Ontario, Canada.

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Eddy, Samuel, and A. C. Hodson, Taxonomic Keys to the Common Animals of the North Central States, Burgess Publishing Co., Minneapolis, Minn., 1961.

(Sample of Announcement Flyer)

THE
SUMMER
SCIENCE PROJECT

at UNIVERSITY SCHOOL

June 19 - July 29, 1967

A creative educational experience, specifically designed for men and boys who are concerned with man's use of and adaptation to his natural environment.

Jointly Sponsored by:

UNIVERSITY SCHOOL
THE CLEVELAND PUBLIC SCHOOLS
THE NATURAL SCIENCE MUSEUM

With the cooperation of

HAWKEN SCHOOL and
other cultural and educational institutions

Supported by a generous grant from

THE CLEVELAND FOUNDATION

PURPOSE:

The purpose of the Project is to bring together especially promising students and particularly talented teachers from the Greater Cleveland area to make a scientific inquiry into land use and to develop a deeper understanding and respect for the natural earth.

STUDENT BODY:

Sixty qualified junior high school boys will be selected, forty from the Cleveland Public Schools and twenty from the suburban public and independent schools.

Openings will be available to boys who have completed grades 7, 8, or 9, but definite preference will be given to boys who are presently finishing 8th grade.

To be eligible a boy must have demonstrated marked academic and personal promise and a real interest in his natural surroundings; must have earned the recommendation of his school principal; must have the approval of his parents or guardian; and must be approved by the Director of the Summer Science Project.

PROGRAM:

Most of the student's time will be spent in the field, studying and analyzing animal and plant life in its natural setting. Various locations in Northern Ohio have been selected for this study. The laboratories at University School and the facilities of the Natural Science Museum will be used to provide more intensive analysis of conditions observed in the field.

(Sample of Announcement Flyer)

Normally, sessions will run from 9:00 A.M. to 3:00 P.M., Monday through Friday. The time may be extended occasionally for special field trips, and there is the possibility of one or two 24-hour light-dark studies.

DRESS:

Dress will be informal, generally suited for the out-of-doors, though occasional field trips may require regular school attire.

FACULTY:

Experienced, creative teachers are drawn from the public and private schools in the metropolitan area. The faculty includes one such teacher for each ten students, as well as a number of teacher-aids to assist in various phases of the program.

BOOKS AND SUPPLIES:

All basic materials will be supplied, and lunch provided to all students without charge. Supplementary meals, as needed, will be provided for overnights and special field trips.

TUITION:

Students who can defray the tuition of $300 for the six-week session are expected to do so. Others are invited to apply for for one of the scholarships made possible by the Cleveland Foundation.

Though all families are asked to make some contribution (see application blank), *none should be discouraged, for financial reasons, from applying for the program.*

TRANSPORTATION:

Students from the City of Cleveland will be provided transportation to and from University School without charge via C. T. S. busses. Others are expected to provide their own transportation to and from the School. Transportation for field trips will be provided by the Project.

APPLICATION:

Application forms, available through the student's school principal or guidance counselor, should be filled out promptly by the candidate and his parents and returned to the school principal.

The Director of the Institute will interview candidates and make the final decisions on admission.

For further information the candidate should consult his school principal, or call or write

Jonathan E. Ingersoll, Director
SUMMER SCIENCE PROJECT
c/o University School
Claythorne and Brantley Roads
Shaker Heights, Ohio
Phone: 321-8260

(Sample of Student Application Form)

THE SUMMER SCIENCE PROJECT
AT
UNIVERSITY SCHOOL

(To be completed by parent:)

Name of student________________________________Month and year of birth______________

Name of parent (or guardian)____

Address of parent____

Home Telephone number______________________

School now attended by student____

School address____

Name of Principal____

****

(Financial information to be supplied by parent or guardian:)

Scholarships provided by the Cleveland Foundation make it possible for most qualified students to attend the Summer Science Project regardless of financial circumstances. Nevertheless, all who can afford to pay all or a part of the $300.00 cost per student of the program are expected to do so. Please complete the following section.

If the student named above is accepted in the Summer Science Project, I will contribute for his tuition the following amount (check one):

$300._____ $250._____ $200._____ $150._____ $100._____ $50._____ $30._____ $20._____ $10._____

Nothing_____

I agree to pay the Summer Science Project the amount indicated above by July 1, 1967.

(Signature of parent or guardian)________________________________

Date_____________________________

This form should be returned to the principal of the school where the student is now enrolled, who will forward it to the Director of the Summer Science Project.

(Sample of Student Recommendation Form)

THE SUMMER SCIENCE PROJECT
AT
UNIVERSITY SCHOOL

Student Recommendation Form

Name of pupil ____________________ School ______________ School Tel. No. ________

Date of birth ______________ Grade Completed __________

Home address ____ ZIP

TEST RECORDS

I.Q. or its equivalent:
Name and level of test ____________
Date of test ______________
Results ______________
____
____

Reading Tests:
Name, level and form of test ________
Date of test ______________
Results ______________
____
____

Demonstrated interest in science or nature: ______________
____
____
____
____
____

CURRENT ACADEMIC RECORD

Subject:	Letter Grade	Deportment	Industry

EVALUATION

SCALE: Superior - 5; Very good - 4; Good - 3; Satisfactory - 2; Poor - 1.

Please feel free to comment further, particularly about any ratings in the 1 - 3 groups. Use back of this sheet.

1. Health. . . . . ____
2. Attendance and punctuality . . . . ____
3. Emotional stability . . . . ____
4. Attitude toward authority . . . . . ____
5. Interest of the home in this pupil's progress . . . . ____
6. Ability to communicate orally . . . ____
7. Ability to communicate in writing . . ____
8. Ability to retain what he has studied . . . . ____
9. Ability to reason . . . . ____
10. Imagination - scope of interests . . ____
11. Sense of group responsibility . . . . ____

The above-named student meets the entrance requirements and has my recommendation for the Summer Science Project.

______________________ ______________________ ______________
Signature Position Date

(Copy of invitation sent to parents.)

UNIVERSITY SCHOOL
SHAKER HEIGHTS, OHIO 44122

July 12, 1967

TO: Parents of Students of the Summer Science Project
FROM: Jonathan E. Ingersoll

Dear Mrs. Wright,

Now that we have passed the halfway point of our Summer Science Project, it is time to start planning for our graduation exercises. But first let me tell you how delightful this summer has been. I can honestly say that in my seventeen years of teaching, I have never worked with a finer bunch of boys, nor a more cheerful, dedicated group of men. The spirit at the Science Project has been fabulous. The boys are cooperative, enthusiastic, bright, well mannered, and yet full of fun. Truthfully, this summer has been a friendly, refreshing, and exciting experience for all of us, students and staff alike.

We are most anxious to have a graduation ceremony that will have the dignity, without being too pompous, to express the enthusiasm we have for our program and for the job that your son, and all of our students, have done. We considered the possibility of having a catered dinner but rejected this because of the limit it would place on attendance. Some of our students come from large families, and we certainly want to welcome brothers and sisters as well as mothers and fathers. We shall keep the speeches to a minimum, but we do want to tell you what we have been doing this summer; and we want a graduation that will be a fitting and memorable conclusion to your son's experience. We hope all your family will attend.

The graduation exercises will be held in the University School Chapel at 8:00 P.M. on Friday, July 28th. The program will probably last from forty-five minutes to one hour, and each boy who completes the course will be awarded a graduation certificate. Please tell your son how many of your family plan to attend the graduation, so he can report to me. Refreshments will be served after the graduation exercises, so I must know how much to order.

Thank you for lending us your son for a great summer. I look forward to meeting you on July 28.

Sincerely,

Jonathan E. Ingersoll

Jonathan E. Ingersoll

Abner has developed great interest in the field work. He is one of our most enthusiastic participants. Please urge him to keep up his interest during the school year. He should join the Future Scientist Program at the Natural Science Museum.